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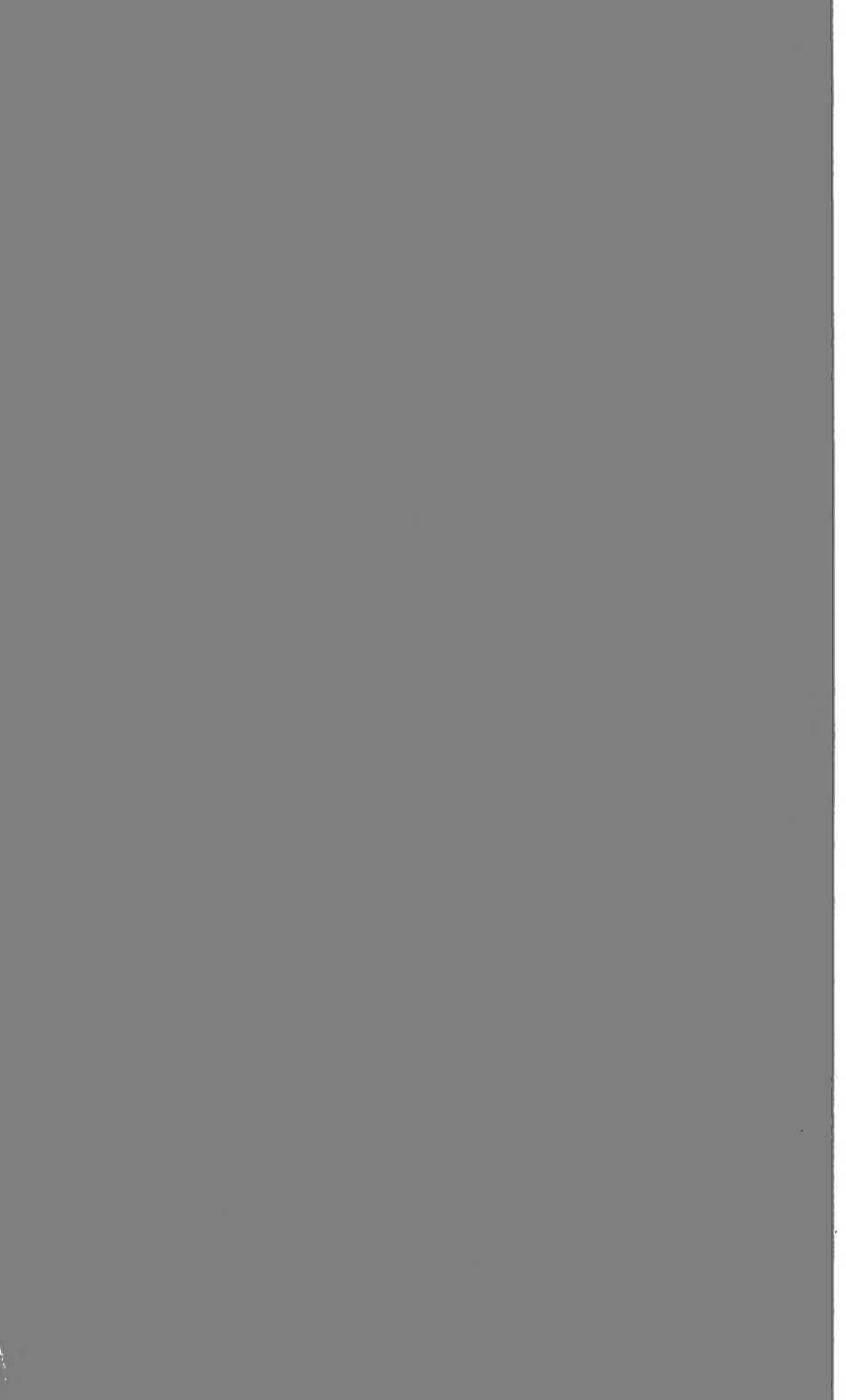
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# NOTES ON THE SPECIES OF ERYTHRINA. VI.

B. A. Krukoff<sup>1</sup> and R. C. Barneby<sup>2</sup>

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### Introduction

Conspectus of species of Erythrina is in preparation which covers the genus worldwide. Data which for various reasons cannot be included in the Conspectus are given in this paper. Rupert Barneby, my co-author of Conspectus, contributed very substantially to it, particularly in organizing the genus into subgenera and sections, and in description and discussions of these. The drawings of all known species are also his and they will be of invaluable help in identifications. In the present paper, in addition to the description of new species, he was very helpful in the studies of various difficult species.

In this paper extension of ranges are noted for several species, 3 species and 1 variety are reduced to synonymy for the first time, 3 species and 1 subspecies (Erythrina caribaea, Erythrina tuxtlana, Erythrina salviiflora and Erythrina herbacea subsp. nigrorosea), are described as new, and Erythrina lysis-temon was placed in the synonymy of Erythrina princeps which was reinstated as a valid species.

#### A. Subgenus Micropteryx Walpers

##### 1. Section Duchassaingia (Walpers) Krukoff

##### 1. Erythrina fusca Loureiro, Fl. Cochinch. 427. 1790.

Jamaica: Portland: C. D. Adams 12305 (MO). Nicaragua: near Rio San Juan, Bunting & Licht 893. Panama: Foster 2180 (US) (Canal Zone), Wilbur & Weaver 11169 (US) (Colon). Venezuela: al lado de Rio Mansanares, Torres 2081 (VEN); Delta Amacuro: Maria Matilda Suarez s. n. (Herb. Nac. Ven. 76281) (VEN). Colombia: Antioquia: Medellin, Lorenzo Uribe Uribe 5114 (COL). Ecuador: Guayas: Dodson & Thien 1258 (MO). Peru: San Martin: Mariscal Cáceres, Dto. Campanilla, Schunke 4283. Brazil: Bahia: Itabuna, Maguire ser. number 58326, J. P. Lanna Sobrinho 4856 (US), 5351 (US).

This is the first record of the species from Department of San Martin. Six collections of this species from Herbarium of the Universidad de los Andes, Merida, Venezuela were examined and annotated. However through error they were not recorded. These collections are from the States of Merida and Delta Amacuro.

##### 2. Section Cristae-galli Krukoff

##### 2. Erythrina crista-galli L. Mant. 99. 1767.

Erythrina crista-galli L. var. leucochlora A. Lombardo,  
Flora arborea y arborescente del Uruguay, ed. 2, 69. 1964.

Brazil: Distrito Federal: gallery forest, Irwin et al.  
8888. Argentina: Corrientes: A. Krapovickas et al. 16823 (MO,  
WIS).

The var. leucochlora was described from Uruguay as a white  
-flowered form with pallid foliage, comparable to albino mutants  
known in E. falcata, E. berteriana, E. caffra and other species.

This is the first record of the species from Federal Dis-  
trict.

### 3. Section Micropteryx

4. Erythrina dominguezii Hassler, Physis 6:123. 1922.

Argentina: Corrientes: V. Marunak 142 (MO).

This is the first record of the species from the province  
of Corrientes.

5. Erythrina ulei Harms, Verh. Bot. Ver. Brand. 48:172. 1907.

Peru: Loreto: Coronel Portillo: Dto. Galleria, Manuel  
Castillo S. 14 (US), 23 (US), 39 (US), 51 (A).

6. Erythrina verna Velloso, Fl. Flum. 304. 1825.

Brazil: Minas Gerais: J. P. Lanna Sobrinho 7200 (US).

7. Erythrina poeppigiana (Walpers) O. F. Cook, Bull. U. S.  
Dept. Agr. Bot. 25:57. 1901.

Venezuela: Merida: La Mucuy, Oberwinkler 13239 (VEN).  
Colombia: Cundinamarca: alt. 1500 m, Lorenzo Uribe Uribe 502  
(COL). Ecuador: Esmeraldas: Little & Dixon 21196, 21235,  
Carlos Jativa 336.

Ten collections of this species from Herbarium of the Uni-  
versidad de los Andes, Merida, Venezuela were examined and  
annotated. However through error they were not recorded. They  
were from the States of Merida and Barinas.

### B. Subgenus Erythrina Krukoff

#### 4. Section Suberosae Krukoff

8. Erythrina suberosa Roxburgh, Fl. Ind. 3:253. 1832.  
Erythrina sublobata Roxburgh, Fl. Ind. 3:255. 1832.

Erythrina alba Roxburgh ex Wight & Walker-Arnott, Prod. Flor. Penins. Ind. Orient. 1:261. 1834 (nomen).  
Erythrina maxima Roxburgh ex Wight & Walker-Arnott, Prod. Flor. Penins. Ind. Orient. 1:261. 1834 (nomen).  
Erythrina suberosa Roxburgh var. glabrescens Prain, Jour. Asiat. Soc. Bengal 66(2):410. 1897.

E. alba and E. maxima are provisional names which appeared as captions on Roxb. plate #104 (= Fl. Ind. 1st edition, 1832 plate #3253 and = Fl. Ind. 2nd edition, 1874 plate #543), published as E. suberosa, and on Roxb. plate #105 (= Fl. Ind. 1st edition, 1832 plate #3255 and = Fl. Ind. 2nd edition, 1874 plate #543), published as E. sublobata.

Without field studies and cultural experiments we are not prepared to recognize the variety E. suberosa var. glabrescens.

#### 6. Section Hypaphorus (Hasskarl) Krukoff

13. Erythrina subumbrans (Hasskarl) Merrill in Philipp. Jour. Sci. Bot. 5:113. 1910.

Erythrina mysorensis Gamble, Kew Bull. 1919:222. 1919

In earlier papers (5c, p. 226 and 5d, p. 136) E. mysorensis was listed as a probable synonym of the common and widespread E. variegata, this opinion based on crucial phrases in the protologue: "calyx spathaceous... carinae petalae liberae." Recently the senior author found at Kew an unpublished drawing of a specimen annotated by Gamble as E. mysorensis and said to have been prepared there from a specimen on loan from Calcutta which was returned June 26, 1919. This excellent drawing, which must be considered authentic for E. mysorensis, surprisingly shows a tomentose calyx shallowly cleft on both sides, therefore two-lipped, and keel-petals connate, slightly shorter than the wings, and about three times shorter than the standard. In all details this drawing portrays not E. variegata, but E. subumbrans (Hasskarl) Merrill. As we are informed that no type of E. mysorensis survives today in the herbarium of the Botanical Survey of India (CAL) we propose to designate the Kew drawing as neotype. The name E. mysorensis is accordingly transferred to the synonymy of E. subumbrans.

#### 7. Section Breviflorae Krukoff & Barneby

14. Erythrina breviflora A. DeCandolle, Prodr. 2:413. 1825.

Mexico: Jalisco: 20 km SE of Autlán, alt. 1700 m, Rzedowski 14533 (ENCB); Michoacan: Waterfall 16438 (US), D. & V. Ugent & R. Flores C. 1700 (alt. + 2185 m) (WIS), 1713 (alt. + 2185 m) (WIS); Guerrero: W. R. Anderson & Ch. Anderson 4933 (MICH) (W of Chilpancinga, alt. 2020 m); Mexico: Mexico: 38483 (US); Morelos: J. M. Diaz Moreno 233 (ENCB) (alt. 2100 m), R. Palacios s. n. (15/IX - 1965) (N of Cuernavaca), s. n. (5/VIII -

1970) (Cerro del Tepozteco, alt. 1800 m); Puebla: alt. + 2130 m, Sharp 44932 (MEXU).

Pods of Anderson & Anderson 4933 are armed with very small spines, whereas these of all other collections so far examined are not aculeate.

This is the first record of the species from the State of Puebla from where previously we had only 5 collections of E. breviflora fma. petraea.

14a. Erythrina breviflora fma. petraea (Brandegge) Krukoff, Brittonia 3:255. 1939.

See comments under E. leptorhiza.

14b. Erythrina breviflora fma. oaxacana Krukoff, Brittonia 3: 256. 1939.

See comments under E. leptorhiza.

#### 8. Section Edules Krukoff

15. Erythrina edulis Triana; M. Micheli, Jour. de Bot. 6:145. 1892.

Colombia: Cundinamarca: Lorenzo Uribe Uribe 1376 (COL).  
Peru: Huanuco: Dwyer 6223; Ancash: C. Earle Smith, Jr. & Jacinto Bas 4963 (US); Ayacucho, eastern Massif of Cordillera Central, T. R. Dudley 11875 (NA). Ecuador: Dodson & Thien 1811 (MO), 1960 (MO).

#### 9. Section Stenotropis (Hasskarl) Krukoff

16. Erythrina speciosa Andrews, Bot. Repos. 7: pl. 443. 1806.

Brazil: Distrito Federal: Irwin et al. 18085; Minas Gerais: Serra da Pomba: J. P. P. Carauta 870 (US); Bahia: Itabuna, N. T. Silva s. n. (Maguire Ser. Number 58369).

#### 10. Section Pseudo-edules Krukoff & Barneby

18. Erythrina schimpffii Diels, Bibl. Bot. 116:96. 1937.

Ecuador: Pastaza: alt. 1500 m, Dodson & Thien 1944 (MO).

This is the first record of the species from the province of Napo-Pastaza.

11. Section Leptorhizae Krukoff

- 20.
- Erythrina leptorhiza
- A. DeCandolle, Prodr. 2:413. 1825.

Mexico: Mexico: A. Pineda R. 788 (ENCB) (mun. Chalco, alt. 2700-2750 m), Garcia Saucedo s. n. (ENCB) (cerca de Tlamenantla), S. Mille Pagaza 54 (ENCB) (Huixquilucan, alt. 2350 m), M. Mita-stein 200 (ENCB) (km 42, carr. antigua Mexico - Puebla); Federal District: Rzedowski 26060 (ENCB) (Tlahuac, alt. 2600 m), M. Bopp O. 125 (ENCB) (Sierra de Guadalupe); Morelos: Sierra de Morelos, alt. 2050 m, Hinton 17163 (ENCB).

Excellent collections of this species cited above throw doubts on two forms of E. breviflora (forma petraea and forma oaxacana). Average terminal leaflets of E. leptorhiza are approximately 8x11cm whereas branchlets with mature leaves on some of the collections examined have terminal leaflets 1.5 cm x 2.5 cm.

12. Section Erythrina

- 22a.
- Erythrina herbacea
- L. subsp.
- herbacea
- .
- Erythrina herbacea
- L. Sp. Pl. 706. 1753. Sp. Plant. 706. 1753, sens. str.

Mexico: Tamaulipas: vicinity of Ciudad Victoria, Runyon 972 (US), Palmer 119, 544 (US), Kenoyer & Crum 3315 (GH), Robert M. King 4509 (US).

The above cited specimens were reexamined by us in 1972 and found to belong here.

- 22b.
- Erythrina herbacea
- L. subsp.
- nigrorosea
- Krukoff & Barneby, subsp. nov.

A subsp. herbacea vexillo roseo (nec rubro) calyce nigro (nec rubescenti) patriaque aliena australi abstans.

Mexico: Oaxaca: on the Gulf slope of Isthmus of Tehuantepec, near Matias Romero: Krukoff 1970-83 (NY-holotype). Mexico: Tamaulipas: P. S. Martin & C. Saravia 1301 (ENCB), Crutchfield & Johnston 5228 (TEX) (3 miles N of Tampico), 5342 (TEX) (4 miles from the Matamoros - Victoria road); San Luis Potosi: Barkley 17M099, J. Rzedowski 24729 (ENCB) (alt. 950 m); Veracruz: Tres Valles - Las Maravillas, Guadalupe Martinez-Calderon 1383 (MICH), 1546 (MEXU), Chiang 412 (MEXU).

Above are cited the new collections examined since the publication of the 5th Supplement. All collections cited in the 5th Supplement under E. standleyana (except those from Tabasco, Campeche and Yucatan which are of E. standleyana) and five collections from Tamaulipas cited here under E. herbacea subsp. herbacea, belong with this subspecies.

The collectors state on the label of #5342 "flrs. pink, not scarlet, as in Texas", on the label of #5228 "corolla pinkish", and on the label of #17M099 "pink-red flowers".

Distribution: Known from 64 collections in Mexico (Tamaulipas, San Luis Potosi, Hidalgo, Puebla, Veracruz, Oaxaca).

The original description of E. standleyana (l, p. 301) was based on twenty-five collections, ten from Cuba, eleven from Yucatan, and one each from Campeche, Isla Cozumel (Quintana Roo), Peten, and Belize, indicating a compact and natural range on the karst limestones of Yucatan Peninsula and western Cuba. At the same time the related E. herbacea was known of course from many collections in southeastern United States from the Carolinas to south peninsular Florida and west to the Gulf Coast prairies of Texas; and further from scattered stations around the Gulf Coast of Mexico in Tamaulipas, San Luis Potosi, and Veracruz. Between 1939 and 1969 additional records came to light which extended the range of E. herbacea into Hidalgo, Puebla, and Oaxaca. These two species, as defined in 1939, appeared to differ not only in characters of foliage (see key following), but also in color of the flower, the standard of E. standleyana being pink, that of E. herbacea bright red.

Very soon after publication of the monograph, however, difficulties began to arise in correlating foliage and flower-color. Already in 1938 Mexia and shortly afterward Alexander encountered in Oaxaca a plant exactly agreeing with the frutescent aspect of E. herbacea in characters of foliage but pink-flowered. During the field-work described in Supplement V (5c, pp. 246-249) the same entity was encountered first on the Gulf slope of Isthmus of Tehuantepec near Matias Romero, and from this point followed intermittently northward through Veracruz into Tamaulipas, its northern limit apparently coinciding very nearly with the tropic line south of Ciudad Victoria. This small, frutescent Erythrina is especially attractive because of its pale pink standard contrasting with a black calyx, in this respect obviously different from typical red-flowered E. herbacea. Pressed flowers of this group soon lose their pigmentation and it is therefore not possible to state with absolute assurance that all populations of the E. herbacea type found southward from Tropic of Capricorn are pink-flowered, but we have since the season of 1970 strong presumptive evidence that this is the case and we propose to distinguish them

collectively from the northern, red-flowered, typical E. herbacea as the new subsp. nigrorosea. This subspecies embraces all those pink-flowered collections from Oaxaca northward over the Gulf plain mistakenly (as we now realize after revision of available material of the complex) cited as E. standleyana in Supplement V (5c, p. 256). While the latter is certainly sometimes and very likely always pink-flowered, it can be recognized instantaneously by the foliage and by the nodding, not ascending flower-buds. The keel-petals of E. standleyana are shorter or at least never longer than the wings, those of E. herbacea sens. lat. commonly but not quite always longer. In different parts of its range E. herbacea shows considerable variation in size and in relative proportions of the inner petals, a variation that appears somewhat random, although in general the keel tends to be proportionately longer northward, reaching a maximum in the Carolinas. No fully reliable difference in this respect can be claimed between E. herbacea and E. standleyana, but the tendency is evident and often decisive. While the mutually exclusive ranges of the two pink-flowered Mexican erythrinas are now fairly well documented, field-work is still required to establish the precise northern limit of ssp. nigrorosea in Tamaulipas and the width of the discontinuity, if there is one, in southeastern Mexico between ssp. nigrorosea and E. standleyana.

In summary we key the three entities as follows:

1. Terminal leaflets broadly ovate (not flabellate-deltate); buds nodding; keel-petals usually shorter than rarely equaling wings; standard pink and calyx black; Cuba, Belize, Guatemala (Petén), Mexico (Yucatan, Campeche, Quintana Roo).....
  23. E. standleyana.
1. Terminal leaflets flabellate-deltate; buds erect; keel-petals usually longer than wings.
  2. Standard pink; calyx black; Mexico (Oaxaca, Veracruz, Puebla, Hidalgo, S. Luis Potosi, Tamaulipas + north to lat. 25° 30'.....
    - 22b. E. herbacea subsp. nigrorosea.
  2. Standard red; calyx not black. U.S.A. and Tamaulipas + south lat. 25° 30'.....
    - 22a. E. herbacea subsp. herbacea.

23. Erythrina standleyana Krukoff, Brittonia 3:301. 1939.

Mexico: Yucatan: Enriquez 193 (MEXU).

24. Erythrina flabelliformis Kearney, Trans. N. Y. Acad. 14:32. 1894.

Mexico: Chihuahua: Pennington 536 (TEX); Jalisco: cerro of Colli, alt. 1650 m, C. L. Diaz Luna 43 (ENCB).

26. Erythrina lanata Rose, U. S. Dept. Agr. N. Am. Fauna 14: 81. 1899.

Mexico: Guerrero: Crisman & Willis 209 (TEX) (near Ocotito, alt. + 1070 m), Rzedowski 27008 (ENCB) (mun. Chilpancingo, alt. + 1550 m), W. R. Anderson & Ch. Anderson 5699 (MICH) (3 - 4 km W of Mazatlan, alt. + 1540 m); Freeland & Spetzman 172 (Acapulco) (MEXU).

We reexamined various collections and found the sagittate keel-petals usually at least slightly, and sometimes much longer than the wings as stated in the monograph (1, p. 290).

27. Erythrina goldmanii Standley, Contr. U. S. Nat. Herb. 20: 181. 1919.

Mexico: Chiapas: W. L. Wonderly 62 (MICH), L. Hilario A. s. n. (Esquintla, alt. 80 m), C. D. Johnson 134-68 (MO).

28. Erythrina caribaea Krukoff & Barneby, sp. nov.

E. folkersii Krukoff affinis sed foliolorum mox glabrescentium nec non axis inflorescentiae pube appresse puberula grisea (nec tomentella rufidula), floribus ad anthesin adscendentibus (nec laxae deflexis), vexilloque elliptico vel lanceolato-elliptico (nec oblongo-oblancoolato) absimilis.

Tree, leafy at anthesis, usually armed with spines; branchlets rather stout, usually aculeate; petioles 3.5-15 cm long, about 1 mm in diam, spineless, soon glabrous; petiolules about 6 mm long and 0.8 mm in diam; soon glabrous; leaflet-blades chartaceous, spineless soon glabrous, not ceriferous beneath; terminal leaflets broadly ovate 9-10.5 cm long, 8-10 cm broad, shortly acute at apex, rounded at base; secondaries about 5 per side; rachis 15-24 cm long, puberulent, soon glabrous; pedicels about 0.3 cm long and 0.4 mm in diam, densely puberulent; calyx chartaceous, campanulate, about 14-19 mm long on the carinal side and 12-15 mm on the vexillar side, gradually much narrowed (usually about 2 mm broad) toward base, amplate to 5-6 mm toward apex, concave, at margin entire, sparsely and minutely puberulent when young, soon glabrous; standard narrowly elliptic, 6-7 cm long, 0.8-1.0 cm broad, usually rounded at

apex; wings narrowly oblong, 8-12 mm long and 2.4-2.7 mm broad; keel-petals 8-11 mm long, united at exterior margin, half-ovate to cuneate at base, claw 3-4 mm long, the basal angle obtuse, not hastate; pod 15-18 cm long, 12-14 mm diam, + 8-ovulate, moderately or between some seeds deeply constricted, the valves stiffly coriaceous, externally glabrate and blackish when ripe, dehiscent first through the ventral suture, the endocarp papery, separating from mesocarp; seeds + 10-11 mm x 7-8 mm, indistinctly ridged dorsally, the testa uniformly scarlet, the hilum elliptic, 4.5 mm x 1.5 mm, greyish-white. (Fruits drawn from Marino Rosas R. 423 (A)).

Type locality: Tabasco (about 10 km from Villahermosa toward Chable), Mexico.

Mexico: Veracruz: Krukoff 86, 95; Manuel Martinez 25 (MEXU); Marino Rosas R. 423 (alt. 1325 m) (A), 1195 (alt. 190 m) (A); Tabasco: Krukoff 1970-46 (NY-holotype; flrs. - 20/II-1970) 1970-51 (Tenosique); Oaxaca: Matuda 32247 (US); Chiapas: between Tapilula and the boundary line with Tabasco, Krukoff 1970-45.

This species is related to E. folkersii Krukoff, which it resembles in the form of the deeply campanulate to subcylindric calyx oblique at orifice, but differs in features of pubescence, attitude of the flowers, and shape of standard. In E. folkersii the young foliage and especially the axis of the inflorescence are loosely and densely tomentulose with brownish hairs, the lower flowers at anthesis stand deflected at about 45° below horizontal, and the standard, although somewhat variable in outline, is prevaillingly oblong-oblanceolate. By contrast the foliage of E. caribaea is only minutely pubescent when young and early glabrous, the axis of the inflorescence is appressed-puberulent with gray hairs, the flowers ascend at about 45° above horizontal, and the standard is elliptic to lance-elliptic.

29. Erythrina folkersii Krukoff & Moldenke, Phytologia 1:286. 1938.

Mexico: Veracruz: Misantra, Comission Dioscorea 2525 (MEXU), 2823 (MEXU); Oaxaca: munic. Chiltepec, G. Martinez -Calderon 51, 1393; Chiapas: near Tuxtla Gutierrez, Comission Dioscorea 1825, 1842. Guatemala: Peten: between Porto Mendes and San Luis, along road, Krukoff 1972/4.

In March 1972 the senior author made a special trip to Peten to check on the erythrinas between Rio Dulce and Flores. Between Porto Mendes and San Luis 86 plants of E. folkersii and 3 plants of E. standleyana were found.

E. folkersii can be identified in sterile condition from other species of sect. Erythrina as follows:

Areoles of leaflets beneath charged with many minute whitish wax-particles, these discrete one from the next and therefore not covering the surface of the areole which appears minutely farinose-ceriferous.... 29. E. folkersii.

Areoles of leaflets not charged with wax-particles, or if so these so closely set as to appear confluent under magnifications of X 20, the surface of the areoles then appearing pallidly lepidote (sometimes in age disintegrating into microscopic free particles)..... 28. E. caribaea and other spp. of sect. Erythrina.

30. Erythrina tuxtlana Krukoff & Barneby, sp. nov.

Affinitatis incertae a sympatrica E. folkersii (cum qua inflorescentiae pube filamentosa fusca partim furcata congruit) calycis ore subsymmetrico truncato (nec post vexillum profunde recesso), carinae petalis truncatis obtusissimis, foliisque glabris distinctissima. Ab E. cochleata, quoad legumen valde contortum simili, calyce haud calcarato-dentato seminumque colore dissimili longe distat.

Tree, leafy at anthesis, armed with spines; branchlets rather stout, usually aculeate; petioles about 18 cm long, spineless, glabrous; petiolules about 6 mm long, 0.8 mm in diam, glabrous; leaflet-blades thin chartaceous, glabrous in all parts, spineless, not ceriferous beneath; terminal leaflets usually elliptic about 12 cm long, about 4.8 cm broad, acuminate at apex and cuneate at base; secondaries + 5 per side; rachis 19-21 cm long, densely tomentellous with deciduous filamentous brown, partly forked hairs, soon glabrous proximally; pedicels pubescent as rachis; calyx chartaceous, tubular-campanulate, about 20 mm long on the carinal side, about 19 mm long on the vexillar side, about 4 mm broad at base, gradually ampliate to about 6 mm at apex, at margin convex, entire, appressed-tomentellous throughout; standard narrowly elliptic, up to 8.5 cm long, about 1.2 cm broad, attenuate at apex and at base; wings rounded at apex, narrowed at base, subequal or slightly longer than keel-petals, about 5 mm long and about 3 mm broad; keel-petals firmly connate, rounded at apex, cuneate at base, about 6 mm long and 4 mm broad; stamens about 6 cm long, separate for about 2.5 cm; pistil + 4.5 cm long, the ovary and gynophore densely tomentellous with brown hairs; fruit-pedicels about 3 cm and up to 2 mm in diam; pods subligneous, usually 13-16 cm long and about 1.6 cm broad, slightly constricted between seeds, after coiled into a circle and much twisted when mature, conspicuously and irregularly undulate-crenulate on the ventral side, with a stipe 2.5--3 cm long, with an acumination 2.5--4 cm long, usually 1-3 seeded; seeds scarlet, with a narrow dark line, extending from the hilum for approximately 1 mm toward

the chalazal end, about 11 mm long and 7 mm broad.

Type locality: Oaxaca (mun. Tuxtepec, cortina de la presa M. Aleman), Mexico.

Mexico: Oaxaca: L. Gonzales Quintero 1837 (ENCB, NY-holotype) (frts., 25/X-1964); Veracruz: Montepio, 19 km E of Gate-maco, tropical forest, L. Gonzales Quintero 2211 (ENCB) (flrs. 19/III-1965).

A species of unknown close affinity, notable for the combination of deeply cylindro-campanulate, subtruncate calyx, minute truncate keel-petals scarcely half as long as the calyx, glabrous foliage, and greatly contorted pod with undulately crenulate sutures. For geographical reasons it may be compared usefully with E. folkersii, similar in the dense but deciduous pubescence of brown filamentous, partly forked hairs that clothes the axis of inflorescence, but different in the tomentulose young foliage, acute keel-petals, and particularly the oblique calyx-mouth, deeply recessed behind the standard. The flowers of E. folkersii are reflexed at full anthesis; unfortunately the material available material of E. tuxtlana does not provide evidence on the attitude of the flower. The pod of E. tuxtlana immediately suggests that of the Central and Northern South American E. cochleata; in outward form they are virtually identical. But the five-spurred calyx and pure red seeds (without black line below hilum), not to mention the different foliage, set E. cochleata far apart, and we interpret the similarity in the fruits as one more example of parallel evolution in which the genus is so rich. So far as Mexico is concerned, no other Erythrina has foliage like that of E. tuxtlana and none with calyx at all similar in size and proportions has similarly minute or truncate keel.

31. Erythrina smithiana Krukoff, Brittonia 3:323. 1939.

Ecuador: Guayas: alt. 50 m, Dodson & Thien 719; Esmeraldas: alt. 70 m, Little & Dixon 21164.

The collectors state on the label of "21164" "calyx rojo, corolla rosado".

32. Erythrina cochleata Standley, Contr. U. S. Nat. Herb. 20: 179. 1919.

Colombia: Antioquia: Quebrada Zuniga, entre Medellin & Envigado, alt. 1600 m, Lorenzo Uribe Uribe 729 (COL).

This is the first record of the species from the department of Antioquia.

34. Erythrina chiapasana Krukoff, Brittonia 3:304. 1939.

Mexico: Chiapas: Krukoff 1971/16 (Comitan, Finca Las Margaritas), L. Gonzalez Quintero 3425 (ENCB) (La Ceiba, alt. 130 m), C. D. Johnson 138-68 (MO).

35. Erythrina atitlanensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):162. 1970.

Guatemala: Solola: Santiago de Atitlan, Krukoff 1972-11.

38. Erythrina tajumulcensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):176. 1970.

Guatemala: San Marcos: entre Godinez & Patzun, Krukoff 1972-13.

39. Erythrina chiriquensis Krukoff, Brittonia 3:322. 1939.

Panama: Chiriqui: along trail north of Cerro Punta, T. Croat 10497.

41. Erythrina macrophylla A. DeCandolle, Prodr. 2:411. 1825.

Guatemala: Solola: San Andres Semetabaj, Krukoff 1972-10.

44. Erythrina steyermarkii Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):175. 1970.

We reexamined various collections and found keel-petals always longer than the wings as stated on the original description.

47. Erythrina huehuetenangensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):172. 1970.

Guatemala: Barillas: near Finca San Isidro, cafetal de Manuel Castaneda, Krukoff 1972-8 (flrs. - Febr. 1972).

49. Erythrina costaricensis M. Micheli, Bull. Herb. Boiss. 2: 145. 1894.

Panama: Cerro Campana: rain forest, Porter et al. 4280 (MO). Colombia: Magdalena: Foster 1423 (A) (alt. 3400 m); Antioquia: Duque 1482 (US) (alt. 1500 m). Ecuador: Imbabura: Ibarra, Jose Marrero & E. L. Little, Jr. 6139 (US).

We reexamined all available slides and flowers of all collections available at NY. In all collections from San Isidro General (Costa Rica), the type locality, including the type collection, as well as in 7 collections from other localities in

Costa Rica and 13 collections from Panama, keel-petals are longer than wings. Only in 3 collections from Costa Rica (including one from Turrialba, Costa Rica) keel-petals were found to be shorter than the wings.

52. Erythrina berteriana Urban, Symb. Ant. 5:370. 1908.

Mexico: Chiapas: Matuda 17601. Costa Rica: Alajuela: near Zarero, Austin Smith A-29. Panama: Chiriqui: alt. 3800 ft. W. & C. von Hagen 2125; Canal Zone: Dwyer et al. 4690 (MO).

In Krukoff 1970-19 and 1970-22, collected between La Tinta and Panzos, Alta Verapaz, Guatemala, the lower flowers at full anthesis tending to reflex against the raceme as in E. folkersii which is growing in the same region.

Krukoff 1970-1 with deep red flowers collected at alt. 800 m near Sanarate, El Progreso, Guatemala, probably is the most handsome form of this species.

53. Erythrina rubrinervia H. B. K. Nov. Gen. & Sp. 6:434. 1824.

Venezuela: Merida: Bernardi 1280 (MER) (alt. 1500-1600 m), B. & F. Oberwinkler 13906 (VEN) (alt. 1750 m); Barinas: Bernardi 6859 (alt. 850-1000 m). Colombia: Cundinamarca: Lorenzo Uribe Uribe 668 (COL), Fred A. Barkley 38823 (GH).

This is the first record of this species from the State of Barinas.

54. Erythrina mexicana Krukoff, Brittonia 3:309. 1939.

Inasmuch as we segregated closely related E. salviiflora and distantly related E. caribaea from this species, we have decided to cite all collections of E. mexicana reexamined by us in 1972.

Mexico: Rose 4023 (US); San Luiz Potosi: Nelson 4386 (F, NY, US) (lvs., frts. - 2/V-1898); Mexico: Hinton 5333 (F, K, NY-holotype) (lvs., flrs., frts. - 13/XII-1933), and 6157 (F, K, M, NY) (lvs., frts. - 13/VI-1934) (Temascaltepec); Veracruz: Gary N. Ross 209 (US) Ocotil Chico, + 630 m, Beaman 5161 (GH) (Laguna Catemaco, alt. 600 m); Guerrero: Langlasse 676 (B, K, F) (lvs., flrs.), Hinton 14708 (lvs., frts. - 24/X-1939) (gar-rizo - Sto. Domingo, alt. 850 m); Oaxaca: Ynes Mexia 9234 and Schultes & Reko 952 (Distr. Choapam, alt. 450 m (lvs., frts. - March and May), 687 (Distr. Tuxtepec, alt. 350 m).

55. Erythrina salviiflora Krukoff & Barneby, sp. nov.

Habitu toto, foliis, seminibus, et praesertim calycis submembranacei forma E. mexicanam (cum qua, allopatrica, mexicana,

hucusque confusa fuit) arcte simulans sed carinae petalis inter se liberis (nec concretis monophyllis) necnon florum alabastris deflexis anguste fusiformibus apice sigmoideo-incurvis (nec adscendentibus obtusis rectis) cito diagnoscenda.

Medium size tree, leafy at anthesis, armed with spines; branchlets rather stout, aculeate; petioles 14-34 cm long, often aculeate, soon glabrous; petiolules 10-12 mm long, 1-2 mm in diam, soon glabrous; leaflet-blades chartaceous, spineless, pubescent with white strigillose hairs when young, soon glabrous, minutely reticulately ceriferous beneath; terminal leaflets rhombic-ovate, 12-24 cm long, 7-17 cm broad, long-acuminate at apex, rounded or broadly cuneate at base; secondaries 8-9 per side; rachis 19-55 cm long, puberulent, soon glabrescent or glabrous proximally; pedicels about 0.6 cm long and 0.4 mm in diam, densely puberulent; calyx thin-chartaceous, tubular-campulate, about 20 mm long on the carinal side and 18 mm on the vexillar side, gradually much narrowed (usually about 1 mm broad) toward base, ampliate to 5-6 mm toward apex, at margin obscurely denticulate and often lacerate at anthesis, provided with a tooth on the upper carinal side (imparting to the calyx-apex a sharply acute appearance), sparsely and minutely puberulent when young, soon glabrous; standard scarlet, narrowly oblanceolate, about 7.5 cm long and 1.5 cm broad, rounded at apex, cuneate at base; wings rounded at apex, narrowed at base, subequal or slightly longer than keel-petals, about 7 mm long and 2.5 mm broad; keel-petals separate, long-acuminate dorsally at apex, narrowed at base about 6.5 mm long and 4 mm broad; stamens about 6.5 cm long, separate for about 3.2 cm; pistil about 5.5 cm long, the ovary and gynophore densely pubescent with rather spreading hairs; fruit-pedicels about 1 cm long and 1 mm in diam; pods subligneous 14-30 cm long and about 1.5 cm broad, constricted between seeds, with a stipe 4-5 cm long and an acuminate beak 3-5 cm long, usually many-seeded; seeds uniformly scarlet, about 11 mm long and 7 mm broad.

Type locality: Suchitepequez (mun. Chicacao, Finca El Naranjo, alt. 1070 m), Guatemala.

Guatemala: P. Preuss 1389 (B), 1389a (B); San Marcos: Giesemann s. n. (Kr. Herb. 9240, 9362, 15129, 15365) (Finca La Union), Steyermark 37565 (F), Krukoff 1969-55 (San Rafael Pie de La Costa, alt. + 1070 m); Quetzaltenango: Steyermark 33556 (F), 33722 (F), 52127 (alt. 850 m), Krukoff 1968-504 (near Finca Patzulin, alt. + 1000 m); Suchitepequez: F. Rosengarten, Jr. s. n. (Kr. Herb. 15124), Steyermark 46733 (F) (Volcan Santa Clara, 1250-2560 m), Krukoff 1967-2 (NY-holotype), 1969-58, 1971-8 (all at Finca Naranjo, alt. + 1170 m), 1969-57 (mun. Chicacao, Finca Colima, alt. 900 m), 1969-59 (Finca Los Horizontes, alt. 1700 m); Solola: Steyermark 48032 (above Finca Moca, alt. 1250-1400 m), Krukoff 1969-8, 1969-14, 1969-60,

1969-162, 1969-163, 1969-164 and 1969-165 (all at Finca Montequina, alt. 1070-1150 m), 1968-506 (Finca Monte de Oro).

This species is related to E. mexicana and E. rubrinervia, (and also to E. lanceolata). Characters common to all four are thinly chartaceous foliage minutely ceriferous beneath, usually rhombic-ovate terminal leaflets, thin-textured calyces borne on puberulent or strigulose (never tomentulose) axes, and seeds of uniform red color, lacking a black line below the hilum. In the cylindric calyx much narrowed toward base and strongly recessed behind the standard E. mexicana resembles the northwardly vicariant, entirely Mexican E. mexicana and the distantly allopatric subandean E. rubrinervia; but differs from both in having free keel-petals and sharply deflexed, narrowly flask-shaped flower buds that are curved into a shallow sigmoid figure. The characters of keel-petals and deflexed buds which differentiate E. salviiflora from E. mexicana and E. rubrinervia are characters shared with the southwardly vicariant E. lanceolata, very similar in facies but readily distinguished by a very short calyx not or scarcely oblique but bilabiate at the mouth, more-over little or not curved in bud.

The ecology of E. salviiflora have been described recently (5a, p. 166) under the mistaken title of the still poorly known E. mexicana, the differential characters of which have just been mentioned. The species occupies a narrow belt at elevations of + 900--1500 m along the Pacific slope of the Guatemalan highlands, just above the belt occupied by E. berteriana, but nevertheless flowering about a month earlier in the year. Characters useful for field-recognition of these two species are found in calyx, pod and seeds. While the calyces are similar in size and form, that of E. salviiflora is of the same red color as the standard, that of E. berteriana part green and part pinkish. Pods of E. salviiflora are on average longer and more regularly constricted, while the seeds, as already pointed out, are uniformly red, lacking the black line below the hilum found in E. berteriana. Further differences of E. berteriana are united keel-petals, and ascending flower-buds.

### 13. Section Gibbosae Barneby & Krukoff

57. Erythrina gibbosa Cufodontis, Arch. Bot. Sist. Fitog. & Genet. 10:34. 1934.

Costa Rica: Puntarenas: San Viro, Al Gentry s. n. (Aug. 11, 1967) (WIS).

14. Section Corallodendra Krukoff

62. Erythrina pallida Britton & Rose, Bull. Torrey Club 48: 332. 1922.

Venezuela: cult. in Jard. Bot. Caracas: Aristeguieta 7974; Bolivar: Reserva Forestal La Paragua, Carlos Blanco 762 (VEN).

This is the first record of the species from the State of Bolivar.

64. Erythrina eggersii Krukoff & Moldenke, Phytologia 1:289. 1938.

St. Thomas: Baron von Eggers s. n. (May 21, 1876) (WIS), s. n. (Jan. 7, 1877) (WIS).

17. Section Caffrae Barneby & Krukoff

71. Erythrina princeps A. Dietrich in Otto & Dietrich Allg. Gartenzeitung 2:305. 1834.

Erythrina lysistemon Hutchinson, Kew Bull. 1933:422. 1933.

Erythrina caffra Thunberg var. mossambicensis Baker f., Jour. Bot. London 76:238. 1938.

The name E. princeps A. Dietrich, tentatively interpreted by Krukoff (1, p. 334) as a synonym of E. caffra Thunberg (or some garden form of it, is here adopted with confidence as the earlier name for what passes currently as E. lysistemon Hutchinson. Krukoff described a dissected flower from an authentic specimen of E. princeps grown in Berlin Botanical Garden in 1844, formerly in Kunth's herbarium at Berlin. This specimen as also the type, dated 1834, was destroyed (H. Scholz in litt., 1972) during the war, but the latter survives in the form of Field Museum Negative 2375 (NY!), which we here designate as neotype. The differences noted by Krukoff between E. princeps and genuine E. caffra are just those which Codd (Bothalia 6(3): 508. 1955) used to separate E. lysistemon from E. caffra; and the exceptionally clear photograph shows the narrow declined flower with included androecium that characterizes E. lysistemon. From herbarium evidence it appears that E. princeps was widely diffused in European stoves during mid-XIX century, but later was lost sight of and never correctly identified with the wild plant.

Another synonym of E. princeps is E. caffra var. mossambicensis Baker f. (Torre 523, BM-holotype, COI).

D. Subgenus Chirocalyx (Meisner) Harvey ex Louis24. Section Dichilocraspeden Harms

80. Erythrina mildbraedii Harms in Mildbr. Deutsch. Zentr.-Afr. Exp. 1907/1908, 2:264. tab. 30. 1911.

Erythrina problematica Duvigneaud & Rochez, Fl. Congo Belge Ruanda - Urundi 6:123. 1954. (sine descr. latin.)

We have examined the holotype of E. problematica (from Zaire) : J. de Wilde 509 (BR) and find that it is not significantly different from E. mildbraedii. The formal publication of E. problematica in Bull. Jard. Bot. Etat Brux., 25: 1955, promised by the authors, never realized.

25. Section Chirocalyx

92. Erythrina sigmoidea Hua, Bull. Mus. Hist. Nat. Par. 3:327. 1897.

Erythrina sudanica Baker f., Leg. Tr. Afr. 2:371. 1929.

We have examined the holotype of E. sudanica (Sudan: Darfur province, alt. 1080 m) H. Lynes 564 (BM-holotype) and found that it falls well within our concept of E. sigmoidea.

94. Erythrina abyssinica Lamarck, Encycl., Bot. 2:392. 1788; ex DC. Prodr. 2:413. 1825; Gillett in Kew Bull. 15:426. 1962.

Erythrina suberifera (Welwitsch) ex Baker, in Oliver Fl. Trop. Africa 2:183. 1871.

Erythrina mossambicensis Sim, For. Fl. Port. E. Afr. 43. tab. 54. 1909.

Erythrina abyssinica Lamarck ex DC. subsp. suberifera (Welwitsch ex Baker) Verdcourt, Kew Bull. 24:284. 1970.

The status of E. suberifera, which we here list in the synonymy of E. abyssinica, remains controversial and cannot be settled satisfactorily without extensive field studies. In our reduction we follow Majot-Rochet & Duvigneaud (in Flora Congo Belge Ruanda - Urundi 6:120, as E. tomentosa R. Brown ex Richard) and Torre (in Conspectus Fl. Angolensis 3(2):248. 1966) dissenting at least provisionally, from the more recent opinion of J. B. Gillett, quoted by Verdcourt (in Kew Bull. 24: 284. 1970) who recognizes E. suberifera as subspecifically distinct. The chief differential characters are found in the polymorphic form of the calyx-teeth, which vary from linear or

linear-caudate in typical E. abyssinica to shortly obovate or spatulate in what have been called E. suberifera. Intermediate forms described from Angola, Rhodesia and Zaire are numerous but it is not known whether these represent introgression between two marginally sympatric species or part of a continuous clinal variation. On the other hand we recognize as distinct the obviously allied E. sigmoidea in which the calyx teeth become yet shorter and in bud are displayed in a flattened rosette, this characteristic calyx being, in the material seen, correlated with differences in pubescence.

The reduction of E. mossambicensis to E. abyssinica is somewhat tentative inasmuch as we have failed to find type-material for comparison, even at University of Natal where the first set of Sim's Angolan collections are preserved. Assuming that the type is lost, we would designate the cited plate, which displays leafy branchlets, flowers and pods, as neotype. The picture strongly suggests one of the forms of E. abyssinica widespread in Mozambique which would fall within subsp. suberifera as defined by Verdcourt.

E. Subgenus Erythraster Barneby & Krukoff

26. Section Erythraster

97. Erythrina euodiphylla Hasskarl, Hort. Bogor. 178. 1858.

This species is reported as having all petals green and leaves fetid when fading (Baker, C. A. and R. C. Bakhuizen van der Brink, Jr., 1963, Flora of Java 1:628. 1963). This information should be checked as the adjective "euodiphylla" means good-smelling leaf.

101. Erythrina velutina Willdenow, Ges. Nat. Freunde Berlin Neue Schr. 3:426. 1801.

Venezuela: Carabobo: Elbert L. Little, Jr. s. n. (Herb. Univ. de Los Andes 16218) (MER); Anzoategui: Luis Ruiz Teran 350 (MER).

Appendix IList of Known Species of ErythrinaA. Subgenus Micropteryx Walpers1. Sect. Duchassaingia (Walpers) Krukoff1. *E. fusca* Loureiro2. Sect. Cristae-galli Krukoff2. *E. crista-galli* L.3. *E. falcata* Benth3. Sect. Micropteryx4. *E. dominguezii* Hassler5. *E. ulei* Harms6. *E. verna* Velloso7. *E. poeppigiana* (Walpers) O. F. CookB. Subgenus Erythrina4. Sect. Suberosae Krukoff8. *E. suberosa* Roxburgh9. *E. microcarpa* Koorders & Valet10. *E. stricta* Roxburgh11. *E. resupinata* Roxburgh5. Sect. Arborescentes Krukoff12. *E. arborescens* Roxburgh6. Sect. Hypaphorus (Hasskarl) Krukoff13. *E. subumbrans* (Hasskarl) Merrill7. Sect. Breviflorae Krukoff & Barneby14. *E. breviflora* Alph. DeCandolle14a. *E. breviflora* forma *petraea* (Brandege) Krukoff14b. *E. breviflora* forma *oaxacana* Krukoff

8. Sect. Edules Krukoff
15. *E. edulis* Triana
9. Sect. Stenotropis (Hasskarl) Krukoff
16. *E. speciosa* Andrews
10. Sect. Pseudo-edules Krukoff & Barneby
17. *E. polychaeta* Harms
18. *E. schimpffii* Diels
11. Sect. Leptorhizae Krukoff
19. *E. montana* Rose & Standley
20. *E. leptorhiza* Alph. DeCandolle
21. *E. horrida* Alph. DeCandolle
12. Sect. Erythrina
- 22a. *E. herbacea* L. subsp. *herbacea*
- 22b. *E. herbacea* L. subsp. *nigrorosea* Krukoff & Barneby
23. *E. standleyana* Krukoff
24. *E. flabelliformis* Kearney
25. *E. coralloides* Alph. DeCandolle
26. *E. lanata* Rose
27. *E. goldmanii* Standley
28. *E. caribaea* Krukoff & Barneby
29. *E. folkersii* Krukoff & Moldenke
30. *E. tuxtlana* Krukoff & Barneby
31. *E. smithiana* Krukoff
32. *E. cochleata* Standley
33. *E. hondurensis* Standley
34. *E. chiapasana* Krukoff
35. *E. atitlanensis* Krukoff & Barneby

36. *E. cobanensis* Krukoff & Barneby
37. *E. williamsii* Krukoff & Barneby
38. *E. tajumulcensis* Krukoff & Barneby
39. *E. chiriquensis* Krukoff
40. Insufficient material; will be described later.
41. *E. macrophylla* Alph. DeCandolle
42. *E. guatemalensis* Krukoff
43. *E. globocalyx* Porsch & Cufodontis
44. *E. steyermarkii* Krukoff & Barneby
45. *E. florenciae* Krukoff & Barneby
46. Still under a study
47. *E. huehuetenangensis* Krukoff & Barneby
48. *E. lanceolata* Standley
49. *E. costaricensis* M. Micheli
50. *E. barqueroana* Krukoff & Barneby
51. *E. americana* Miller
52. *E. berteriana* Urban
53. *E. rubrinervia* H. B. K.
54. *E. mexicana* Krukoff
55. *E. salviiflora* Krukoff & Barneby
56. *E. castillejiflora* Krukoff & Barneby
13. Sect. Gibbosae Barneby & Krukoff
57. *E. gibbosa* Cufodontis
14. Sect. Corallodendra Krukoff
58. *E. amazonica* Krukoff
59. *E. similis* Krukoff
60. *E. peruviana* Krukoff

- 61. *E. mitis* Jacquin
- 62. *E. pallida* Britton & Rose
- 63a. *E. corallodendrum* L. var. *corallodendrum*
- 63b. *E. corallodendrum* L. var. *bicolor* Krukoff
- 63c. *E. corallodendrum* L. var. *connata* Krukoff
- 64. *E. eggersii* Krukoff & Moldenke
- 65. *E. buchii* Urban
- 66. *E. leptopoda* Urban & Ekman
- 67. *E. elenae* Howard & Briggs
  - 15. Sect. Cubenses Krukoff
- 68. *E. cubensis* C. Wright
  - 16. Sect. Olivianae Krukoff & Barneby
- 69. *E. oliviae* Krukoff
  - 17. Sect. Caffrae Barneby & Krukoff
- 70. *E. caffra* Thunberg
- 71. *E. princeps* A. Dietrich
  - 18. Sect. Humeanae Barneby & Krukoff
- 72. *E. humeana* Sprengel
- 73. *E. zeyheri* Harvey
  - 19. Sect. Acanthocarpae Barneby & Krukoff
- 74. *E. acanthocarpa* E. Meyer
  - C. Subgenus Tripterolobus Barneby & Krukoff
- 20. Sect. Tripterolobus
- 75. *E. greenwayi* Verdcourt
  - D. Subgenus Chirocalyx (Meisner) Harvey ex Louis
- 21. Sect. Bruceanae Barneby & Krukoff
- 76. *E. brucei* Schweinfurth

22. Sect. Macrocybium (Walpers) Barneby & Krukoff
77. *E. vogelii* Hooker f.
78. *E. senegalensis* Alph. DeCandolle
23. Sect. Dilobochilus Harms
79. *E. excelsa* Baker
24. Sect. Dichilocraspeden Harms
80. *E. mildbraedii* Harms
25. Sect. Chirocalyx
81. *E. pygmaea* Torre
82. *E. mendesii* Torre
83. *E. baumii* Harms
84. *E. decora* Harms
85. *E. livingstoniana* Baker
86. *E. tholloniana* Hua
87. *E. addisoniae* Hutchinson & Dalziel
88. *E. droogmansiana* DeWildeman & Th. Durand
89. *E. orophila* Ghesquiere
90. *E. sacleuxii* Hua
91. *E. haerdii* Verdcourt
92. *E. sigmoidea* Hua
93. *E. latissima* E. Meyer
94. *E. abyssinica* Lamarck
- E. Subgenus* Erythraster Barneby & Krukoff
26. Sect. Erythraster
95. *E. variegata* L.
96. *E. tahitensis* Nadeau
97. *E. euodiphylla* Hasskarl

98. *E. vespertilio* Benthams  
 99. *E. insularis* F. M. Bailey  
 100. *E. merrilliana* Krukoff  
 101. *E. velutina* Willdenow  
 101a. *E. velutina* Willdenow forma *aurantiaca* (Ridley) Krukoff  
 102. *E. grisebachii* Urban  
 103. *E. burtii* Baker f.  
 104. *E. burana* R. Chiovenda  
 105. *E. perrieri* R. Viguier  
 106. *E. schliebenii* Harms  
 107a. *E. melanacantha* Taubert ex Harms subsp. *melanacantha*  
 107b. *E. melanacantha* Taubert ex Harms subsp. *somala* (Chiovenda) Gillet

## Appendix II

### Authors of African Species

- |                                |   |
|--------------------------------|---|
| Baker, J. G.                   | - <i>excelsa</i> , <i>livingstoniana</i> (2).                                     |
| Baker f., E. G.                | - <i>burtii</i> (1).  |
| Chiovenda, R.                  | - <i>burana</i> (1).  |
| DeCandolle, Alph.              | - <i>senegalensis</i> (1).  |
| DeWildeman, E. & Th. Durand    | - <i>droogmansiana</i> (1).   |
| Dietrich, A.                   | - <i>princeps</i> (1).  |
| Ghesquiere, J.                 | - <i>orophila</i> (1).  |
| Gillet, J. B.                  | - <i>melanacantha</i> subsp. <i>somala</i> (1).                                   |
| Harms, H.                      | - <i>baumii</i> , <i>decora</i> , <i>mildbraedii</i> ,<br><i>schliebenii</i> (4). |
| Harvey, W. H.                  | - <i>zeyheri</i> (1).   |
| Hooker f., W. J.               | - <i>vogelii</i> (1).   |
| Hua, Henri                     | - <i>sacleuxii</i> , <i>sigmoidea</i> ,<br><i>tholloniana</i> (3).                |
| Hutchinson, J. & J. M. Dalziel | - <i>addisoniae</i> (1).  |
| Lamarck, J. B. A. P. M. de     | - <i>abyssinica</i> (1).  |
| Loureiro, João de              | - <i>fusca</i> (1).   |
| Meyer, E.                      | - <i>acanthocarpa</i> , <i>latissima</i> (2).                                     |
| Schweinfurth, G. A.            | - <i>brucei</i> (1).  |
| Sprengel, K.                   | - <i>humeana</i> (1).   |
| Taubert, P. H. W.              | - <i>melanacantha</i> subsp. <i>melanacantha</i> (1).                             |

Thunberg, C. P. P.	- caffra (1).
Torre, A. R.	- mendesii, pygmaea (2).
Verdcourt, Bernard	- greenwayi, haerdii (2).
Viguier, R.	- perrieri (1).

### Appendix III

#### Collectors of the type specimens of African species

Addison, F.	- addisoniae (1).
Baum, H.	- baumii (1).
Bruce, James	- abyssinica (1).
Burt, B. D.	- burtii (1).
Cabra, Capt.	- droogmansiana (1).
Collector undesignated	- caffra, fusca, humeana, princeps, sigmoidea (5).
Dinter, Kurt	- decora (1).
Drege, J. F.	- acanthocarpa, latissima (2).
Ghasquiere, J.	- orophila (1).
Greenway, P. J.	- greenwayi (1).
Haerdi, F.	- haerdii (1).
Kirk, Sir John	- livingstoniana (1).
Mann, Gustav	- excelsa (1).
Mendes, Eduardo	- mendesii, pygmaea (2).
Mildbraed, G. W. J.	- mildbraedii (1).
Milizia Forestale	- burana (1).
Perrier, Alfred	- perrieri (1).
Puccioni and Stefanini	- melanacantha subsp. somala (1).
Riva, Domenico	- melanacantha subsp. melana- cantha (1).
Roussillon,	- senegalensis (1).
Sacleux, R. P.	- sacleuxii (1).
Schlieben, H. J.	- schliebenii (1).
Steudner, von H.	- brucei (1).
Thollon, Francois-Romain	- tholloniana (1).
Vogel, E.	- vogelii (1).
Zeyher, C. L. P.	- zeyheri (1).

### Appendix IV

#### Countries of origin of the type specimens of African species

Senegal	- senegalensis (1).
Guinée	- sigmoidea (1).
Sierra Leone	- addisoniae (1).
Fernando Po	- vogelii (1).
Cameroon	- excelsa (1).
Gabon	- tholloniana (1).
Zaire Republic	- droogmansiana, mildbraedii, orophila (3).

Ethiopia	- abyssinica, brucei, burana, melanacantha subsp. melanacantha (4).
Somalia	- melanacantha subsp. somala (1).
Tanzania (incl. Zanzibar)	- burttii, greenwayi, haerdii, sacleuxii, schliebenii (5).
Mozambique	- livingstoniana (1).
Angola	- baumii, mendesii, pygmaea (3).
S. W. Africa	- decora (1).
S. Africa	- acanthocarpa, caffra, humeana, latissima, zeyheri (5).
Madagascar	- perrieri (1).
Viet-Nam	- fusca (1).
Cultivated	- princeps (1).

### Appendix V

#### List of African species which are known to occur in various countries

Senegal	- senegalensis (1).
Gambia	- senegalensis (1).
Mali	- excelsa, mildbraedii, senegalensis, sigmoidea (4).
Portuguese Guinea	- senegalensis, sigmoidea (2).
Guinee	- addisoniae, mildbraedii, senegalensis, sigmoidea (4).
Sierra Leone	- addisonia, mildbraedii, senegalensis (3).
Liberia	- mildbraedii, senegalensis (2).
Ivory Coast	- addisoniae, excelsa, mildbraedii, senegalensis, vogelii (5).
Ghana	- addisoniae, mildbraedii, senegalensis, vogelii (4).
Togo	- senegalensis, vogelii (2).
Dahomey	- senegalensis (1).
Nigeria	- addisoniae, excelsa, mildbraedii, tholloniana, senegalensis, sigmoidea, vogelii (7).
Fernando Po	- vogelii (1).
Chad	- sigmoidea (1).
Ubangi-Shari	- sigmoidea (1).
Cameroon	- droogmansiana, excelsa, mildbraedii, senegalensis, sigmoidea (5).
Gabon	- droogmansiana, mildbraedii, tholloniana, senegalensis (4).
Congo (Brazzaville)	- addisoniae (1).

Zaire Republic	- abyssinica, baumii, droogmansiana, excelsa, mildbraedii, orophila, tholloniana (7).
Ruanda	- abyssinica (1).
Sudan	- abyssinica, excelsa, sigmoidea, (3).
Ethiopia	- abyssinica, brucei, burana, burtii, melanacantha subsp. melanacantha, melanacantha subsp. somala (5 + 1).
Eritrea	- abyssinica (1).
Somalia	- melanacantha subsp. somala (1).
Socotra	- melanacantha subsp. somala (1).
Uganda	- abyssinica, excelsa, mildbraedii (3).
Kenya	- abyssinica, burtii, excelsa, princeps, melanacantha subsp. melanacantha, sacleuxii (6).
Tanzania	- abyssinica, burtii, excelsa, greenwayi, haerdii, princeps, melanacantha subsp. melanacantha, sacleuxii, schliebenii, variegata (10).
Mozambique	- abyssinica, humeana, latissima, livingstoniana, princeps (5).
Swaziland	- humeana, latissima, princeps (3).
Malawi	- abyssinica, livingstoniana, princeps (3).
Zambia	- abyssinica, baumii, excelsa, livingstoniana (4).
Rhodesia	- abyssinica, baumii, humeana, latissima, livingstoniana, princeps, zeyheri (7).
Botswana	- latissima, princeps, zeyheri (3).
Angola	- abyssinica, baumii, droogmansiana, mendesii, pygmaea (5).
S. W. Africa	- decora, mendesii (2).
S. Africa	- acanthocarpa, caffra, humeana, latissima, princeps, zeyheri (6).
Comoro Island	- fusca, perrieri (2).
Madagascar	- fusca, perrieri, variegata (3).

#### Appendix VI

List of species which are known to occur  
in various departments in Guatemala

Alta Verapaz	- berteroaana, cobanensis, folkersii, guatemalensis, salviiflora, williamsii (6).
Baja Verapaz	- berteroaana, guatemalensis (2).
Chimaltenango	- macrophylla (1).
Chiquimula	- berteroaana (1).
El Progreso	- berteroaana, guatemalensis (2).
El Quiche	- berteroaana, chiapasana, macrophylla (3).
Esquintla	- berteroaana, fusca (2).
Guatemala	- berteroaana, macrophylla (2).
Huehuetenango	- barqueroana, berteroaana, castillejiflora, chiapasana, goldmanii, guatemalensis, hue- huetenangensis, macrophylla (8).
Izabal	- berteroaana, folkersii, fusca, hondurensis (4).
Jalapa	- berteroaana (1).
Jutiapa	- berteroaana, fusca (2).
Peten	- berteroaana, folkersii, standleyana (3).
Quetzaltenango	- berteroaana, macrophylla, salviiflora (3).
Retalhuleu	- berteroaana (1).
Sacatepequez	- berteroaana, macrophylla (2).
San Marcos	- berteroaana, florenciae, macrophylla, salviiflora, tajumulcensis (5).
Santa Rosa	- berteroaana (1).
Solola	- atitlanensis, berteroaana, macrophylla, salviiflora (4).
Suchitepequez	- berteroaana, salviiflora (2).
Totonicapan	- macrophylla (1).
Zacapa	- berteroaana, guatemalensis (2).

Notes

As a result of field studies in 1969-71, carried out in the dry season when erythras are in flower and fruit, it is possible to report with some accuracy on the distribution of the species in parts of Guatemala. Eighteen of the 25 Erythrina known to occur in Central America have now been found within the borders of Guatemala, a greater number than in any other American country except Mexico. The Pacific lowlands or tierra caliente in departments Retalhuleu, Suchitepequez, and Escuintla, like the eastern lowlands or dry oriente in departments Santa Rosa, Jutiapa, Jalapa, and Chiquimula, are poor in species. Here we find only the common E. berteriana, widespread through lowlands of Central America and found in all departments of Guatemala except Chimaltenango and Totonicapan. Erythrina is again poorly represented in the highlands or tierra fria of departments Quetzaltenango, Totonicapan, El Quiche, Chimaltenango, and Sacatepequez, the home of E. macrophylla and E. chiapasana only. It is on the limestone soils at middle elevations (approximately 1300--2000 m in departments Huehuetenango and Alta Verapaz that the genus is most highly diversified; in this relatively small area are found nine species: E. cobanensis, E. williamsii, E. tajumulcensis, E. guatemalensis, E. huehuetenangensis, also E. folkersii, E. berteriana, E. barqueroana and E. castillejiflora on the lower elevations.

The Erythrina flora of Sierra de las Minas, Sierra de Santa Cruz, and Montaña del Mico is poorly known, as is that of the lowlands of northern Huehuetenango, El Quiche, and Alta Verapaz. From these areas we can expect new records, possibly even undescribed species.

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(In order to conserve space, we are citing here only the papers which are not cited in Supplements III and V).

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48. Burkart, Arturo. Erythrina L. in *Las Leguminosas Argentinas silvestres y cultivadas*, 2nd edition, 387-390. fig. 2 (drawing of E. falcata). 1952.
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Supplementary Notes on American Menispermaceae IX

B. A. Krukoff<sup>1</sup> and R. C. Barneby<sup>2</sup>

Since the last serial paper (Supplement VIII) was published we have examined 162 new collections, extending our knowledge of several species previously known from incomplete material. Staminate flowers of Telitoxicum minutiflorum, Abuta brevifolia and Orthomene verruculosa and fruits of Chondrodendron microphyllum and Telitoxicum peruvianum are described for the first time; extensions of range are reported for 13 species; one species, Abuta fluminum, is described as new, and one new combination, Telitoxicum negroense, is proposed.

During the last 3 years numerous samples of wood were sent to Prof. Yasuo Inubushi of Kyoto University for chemical studies. These samples were mostly collected by Dr. G. France and Sr. Nilo Silva in Brazil and by Dr. J. Schunke Vigo in Peru. Samples of several species of Abuta were found to be free of alkaloids. For the isolation and identification of certain alkaloids see under Chondrodendron tomentosum and Sciadotenia toxifera.

I. CHONDRODENDRON Ruiz & Pavón, Syst. Veg. 261. 1798.

1. Chondrodendron tomentosum Ruiz & Pavón, Syst. Veg. 261. 1798.

Peru: San Martín, Mariscal Cáceres, Tocache Nuevo, Schunke 3880, 4801 (F).

According to a private communication from Prof. Yasuo Inubushi of Kyoto University two already known alkaloids, isochondrodendrine and curine, were isolated from Schunke 1970/19 and identified; another alkaloid found in very minute quantities was not further investigated.

1. Consulting Botanist of Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey
2. Honorary Curator of Western Botany, The New York Botanical Garden

2. Chondrodendron platiphyllum (A. de St. Hilaire) Miers, Ann. Mag. Nat. Hist. III. 19:122. 1867.

Brazil: Rio Grande do Norte: Baía Formosa, Eng<sup>o</sup> Estrela, Mello Filho 1725 (Mus. Nac. Rio 108713) (R).

This is the first record of the species from Rio Grande do Norte.

3. Chondrodendron microphyllum (Eichler) Moldenke in Krukoff & Moldenke, Brittonia 3:11. 1938.

Brazil: Rio Grande do Norte, matos do Eugênio Estrela, Mello Filho 1564 (R).

This is the first record of the species collected outside the State of Bahia.

The fruits of this species, previously unknown, became available to us. They are essentially as of other species of the genus, as described in Supplement #8. There are six carpels radially diverging from a clavate receptacle, all free from each other. The drupe is glabrous, its body oblong-ellipsoid, 1.5-1.6 x 1-1.3 cm, abruptly contracted at base into a stipelike neck 1.5-3 mm long and 1.5-2 mm diam. The thin-shelled endocarp is pale-brown and shows the same exterior pattern of nervature as that of Sciadotenia, but more delicate and less deeply incised. Study of the fruit confirms the generic disposition of C. microphyllum hitherto isolated in Chondrodendron because of the unique synandrium of the staminate flower. (Belem & Pinheiro 2317, 2732; Belém 3505).

II. CURAREA Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2):7. 1971.

1. Curarea toxicofera (Weddell) Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2):9. 1971.

Brazil: Amazonas: Prance et al. 13931 (basin of Rio Purus, Rio Apitua, forest on terra firme); L. Coelho & D. Coelho 41 (= INPA 27989) (Janauaca), Prance et al. 11272 (near Manaus). Peru: San Martín: Mariscal Cáceres, Ditto. Tocache Nuevo, Schunke 3830.

Local names: "Bicava" (Jamamadi Indians). Prance states on the label: "stem bark used by Jamamadi Indians as ingredient of arrow and dart poison mixed with Prance et al. 13929 (stem bark) ("Ira") - *Strychnos solimoesana* Krukoff, Prance et al. 13936 (stem bark) ("Boa") - *Guatteria* cf. *megalophylla* Diels, and Prance et al. 13937 (stem bark) ("Balala") - *Fagara* sp."

2. *Curarea candicans* (L. C. Richard) Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2):12. 1971.

Venezuela: Bolívar: near El Dorado, B. Rollet s.n. (VEN).

This is the first record of the genus from Venezuela.

In order to verify our reduction of *Chondodendron limacifolium* to *Curarea candicans* (See Supplement #8) we borrowed *Siqueira* s.n. (HAMP 8266) (O'fl.) (type coll. of *Abuta limacifolia* Diels) and coll. undesign. s.n. (HAMP 9565) (frts.) from Museu Paraense Emilio Goeldi. The flowers agree with those of *C. candicans* and not with what we designated *C. tecunarium*; the fruits are a perfect match for these of *C. candicans* as represented by Forest Dept. 3623 (K) from Guiana.

3. *Curarea tecunarium* Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2):12. 1971.

Brazil: Amazonas: Prance et al. 16146 (basin of Rio Negro, foothills of Serra Curicuriari), 16453 (basin of Rio Purus, Rio Cunhua at Deni Indian village, 6°43' S, 66° 47' W).

Prance states on the label (Prance 16453): "the stem is crushed, placed in water and stirred; the mixture is drunk as a contraceptive by Deni Indians."

This is the first record of the species from the basin of Rio Purus.

### III. *SCIADOTENIA* Miers in Ann. Nat. Hist. II, 7:43. 1851.

1. *Sciadotenia cayennensis* Benthams, Jour. Linn. Soc. Bot. 5 (Suppl. 2):51. 1861.

French Guiana: Oldeman 1977 (CAY), 3180 (CAY) and DeGranville 654 (CAY) (near Saul); Oldeman B-1899 (CAY) (upper Approuague); DeGranville C-79 (CAY) (Grand Inuni); Oldeman T-715 (CAY) (upper Oyapock).

The cited collections from four widely separated localities present additional evidence that *S. cayennensis* is well distributed in French Guiana.

2. Sciadotenia toxifera Krukoff & A. C. Smith, Bull. Torrey Club 66:308. 1939.

Brazil: Amazonas: Rio Auaatí Parana, igapo, Byron 310 (=INPA 28171). Peru: San Martín: Mariscal Cáceres, Tocache Nuevo, Schunke 1971/30, 1971/32, 3819, 3953, 4605 (F), 4634 (F), 4637 (F), 4639 (F), 5024.

According to a private communication from Prof. Yasuo Inubushi of Kyoto University two already known alkaloids--d-O, O-dimethylcurine and l-isochondrodendrine were isolated from Schunke 1971/30, also one new alkaloid which was designated as epinorcycleanine. The already known alkaloid, cycleanine has been isolated from Cyclea insularis Makino, Stephania cepharantha Hayata and other plants.

4. Sciadotenia paraensis (Eichler) Diels in Engler, Pflanzenreich 4(94):86. 1910.

Brazil: Para: Bragança, J. S. dos Santos s.n. (HAMP 7290).

5. Sciadotenia sagotiana (Eichler) Diels in Engler, Pflanzenreich 4(94):86. 1910.

Brazil: Amazonas: near Manaus, W. Rodrigues s.n. (7/12-1954) (INPA 333), Chagas s.n. (16/2-1956) (INPA 3445).

The collections cited provide additional evidence that the species is common in "capoeiras" near Manaus.

7. Sciadotenia sprucei Diels in Engler, Pflanzenreich 4(94):84. 1910.

Venezuela: Amazonas: basin of Rio Negro, coll. undesign. s.n. (Dec. 15, 1955) (Z). Brazil: Para: A. Miles Moss 90 (US); Amazonas: near Manaus, Froes 30178 (INPA), W. Rodrigues s.n. (28/9-1954) (INPA 164), Chagas s.n. (28/9-1954) (PG).

12. Sciadotenia amazonica Eichler in Flora 47:395. 1864 and in Martius, Fl. Bras. 13<sup>1</sup>:201, tab. 47, fig. 3. 1864.

Peru: Loreto: near Iquitos, Erik Asplund 14096 (S), 14469 (S).

13. Sciadotenia duckei Moldenke in Krukoff & Moldenke, Brittonia 3:30. 1938.

Brazil: Amazonas: near Manaus, Herb. Schwacke 551 (Mus. Nac. Rio 45432) (R), 3467 (Jard. Bot. Rio 85196) (RB), W. Rodrigues s.n. (25/3-1955) (INPA 908), 8864 (23/4-1970) (INPA 28079), J. Chagas s.n. (25/3-1955) (PG), France et al. 11620.

The collections cited above provide additional evidence that the species is common in "capoeiras" near Manaus.

14. Sciadotenia pachnococca Krukoff & Barneby, Mem. N. Y. Bot. Gard. 22(2):24. 1971.

Brazil: Amazonas: basin of Rio Negro, Rio Uneiuxi,  $\pm 300$  km above mouth, Prance et al. 15558 (Makú Indian village).

This is the second collection of the species.

V. TELITOXICUM Moldenke, Brittonia 3:42. 1938.

1. Telitoxicum minutiflorum (Diels) Moldenke in Krukoff & Moldenke, Brittonia 3:49. 1938.

Brazil: Amazonas: basin of Rio Negro, 2 kms above Tapuruquara, forest on terra firme, Prance 15386.

Excellent staminate inflorescences and flowers recently became available to us: staminate inflorescence solitary and paired from axils of living leaves, appearing simply racemose, the primary axis densely puberulous, 0.6--1 mm diam, 5--13 cm long, the flowers borne in subsessile 2--4-flowered cymules, these toward the base elevated on secondary axis not over 2 mm long; pedicels up to 0.5 mm long; flowers glabrous except for the tips of outer sepals, black when dry, or subglaucescent; 3 outer sepals ovate 0.7 X 0.45, 3 inner ovate, submembranous-margined, the tips incurved-connivent over the anthers, 1.5 X 1.1 mm; 6 petals,  $\pm 0.5$  mm long, vase-shaped, contracted at base into a narrow funnel, the margins incurved but not enfolding the opposed stamen; androecium 6-merous, glabrous, the filaments all free, erect, straight or a trifle incurved, slightly enlarged upward, the whole 0.55 mm long, the anther-sacs terminal, erect, collateral, 0.15 mm long, dehiscent by vertical slits. (Tessmann 4626 (G), 4565 (isotype) (G)).

4. Telitoxicum glaziovii Moldenke in Krukoff & Moldenke, Brittonia 3:47. 1938.

Brazil: basin of Rio Jari, Nilo T. Silva 3423, 3434.

6. Telitoxicum peruvianum Moldenke in Krukoff & Moldenke, Brittonia 3:45. 1938.

Peru: San Martin: Mariscal Caceros, Tocache Nuevo, Schunke 1971/36, 4746 (K); San Martin Loreto: vicin. of Aguaytia, Mathias & Taylor 5022 (LA).

Inflorescence ♀ simply racemose, few-flowered, the fruiting pedicels becoming  $\pm 8$ --10 mm long, 4--5 mm diam; drupe subsymmetrically ovoid-ellipsoid, 3--3.3 cm long, 2--2.2 cm diam, slightly compressed, the mealy-coriaceous exocarp  $\pm 2$  mm thick, when dry black externally, glabrous or almost so, the pulpy mesocarp up to 1 mm thick, the leathery testa of the endocarp

scarcely sculptured or engraved, 0.25--0.4 mm thick in section. (Schunke 1971/36).

The second and third records for T. peruvianum and the first pistillate plants collected. The fruit differs little from that of the closely related T. glaziovii of the lower Amazon. The collector notes on the label of Schunke 4746 "el tallo es arredondeado en la interior amarillo pálido, semi-amargo".

7. Telitoxicum negroense (Krukoff & Moldenke) Krukoff, comb. nov.

In the protologue Abuta negroensis was distinguished from all known Amazonian members of tribes Triclisieae and Anomospemeae by its pinnately veined leaf-blades woolly beneath. In absence of flowers, the affinity could not be made out for certain, and the species was referred provisionally to Abuta, of which some species, notably A. candollei, A. grisebachii, and A. splendida, have similar vesture, although combined with plinerved blades. Recently an isotype (Froes 12423, GH), not seen previously, was compared with material of Telitoxicum krukovii and found to resemble this species very closely in form and nervation of the leaves. Pinnate blades are characteristic of genus Telitoxicum. In this genus T. negroense will be readily recognized by its tomentose vesture.

VI. ABUTA Barrère ex Aublet, Pl. Guyane 1:618, pl. 250. 1775.

2. Abuta splendida Krukoff & Moldenke, Bull. Torrey Club 68: 241. 1941.

Venezuela: Manara 165 (VEN); Amazonas: Reserva Forestal El Sipapo, Blanco 1173 (VEN). Brazil: Para: basin of Rio Jari, Nilo T. Silva 3433; basin of Rio Tapajos, near Santarém, Cavalcante 1773 (PG). Terr. Roraima: Rio Mucajai, France et al. 11036. Peru: San Martín: Mariscal Cáceres, Tocache Nuevo, Schunke 1971/38; Huanuco: Leoncio Prado, Dtto. Rupa Rupa, Schunke 5168.

Blanco 1173 is the first record of the species from Amazonas (Venezuela). The label on Schunke's specimen reads: "El tallo es aplastado, en la parte exterior de color negruzco; y en la interior amarillo pálido con sabor muy amargo".

6. Abuta aristeguietae Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):21. 1970.

Peru: Huanuco: Monzón, elev. 800 m, Woytkowski 5535 (GH).

9. Abuta pahni (Martius) Krukoff & Barneby, Mem. N. Y. Bot. Gard. 22(2):43. 1971.

Venezuela: Bolívar: Alto Caroni, alt. 800 m, F. Cardona 2601 (L). Brazil: Amazonas: Schultes 9840c (IAN). Peru: San Martín: Mariscal Cáceres, Tocache Nuevo: Schunke 1970/28, 4559 (F), 4966 (F).

The label on Schunke's specimen reads: "El tallo mide 4" de dia., en la parte interior es de color amarillo intenso, con sabor amargo".

10. Abuta fluminum Krukoff & Barneby, sp. nov.

A. pahni ac A. aristeguietae adspectu simulans, ab ambabus foliorum pube appressa brevissima sparsa, ab ea imprimis inflorescentia  $\sigma$  simpliciori, androecii dense spinuloso-papillati filamentis crasse clavatis dilatatis antherisque staminum interiorum collateralibus introrsis horizontaliter dehiscentibus exteriorum sublaterali-introrsis rima obliqua apertis, necnon drupae majoris extus pallide lenticellatae endocarpio profundissime insculpto, ab A. aristeguietae (cujus inflorescentia  $\sigma$  infauste ignota) inflorescentia  $\sigma$  laxa, pedicellis fructiferis elongatis, endocarpiique sculptura longius distat.

Weak woody vines, the blackish rope (acc. Schunke) round in section, the livid, non-lenticellate young stems pilosulous with subretorse hairs up to 0.2--0.4 mm long, the leaf-blades beneath with forwardly appressed hairs up to 0.25--0.45 mm long dispersed along the veins and scattered between them; petioles slender 2--7 cm long, little dilated apically; leaf-blades (dry) membranous becoming subchartaceous, brownish-olivaceous, slightly paler beneath, ovate to broadly ovate-elliptic from a cuneate base, at immediate insertion shortly rounded and obtuse, short-acuminate at apex, (5) 7--14 cm long, (2.5) 4--7 cm wide; primary venation of 5 slender nerves from base, the outer pair weak, reaching  $\frac{1}{3}$  length of blade, the inner pair incurved-ascending  $\frac{2}{3}$  its length, the costa giving rise from near or above middle to 1--2 pairs of secondaries, the primary ones impressed above or becoming so, the rest immersed or feebly prominent above, prominent beneath, the reticulation above extremely fine and delicate, the smallest areoles  $\pm 0.1$  mm diam, similar but a little coarser beneath; inflorescence  $\sigma$  subterminal to young branchlets or (acc. Asplund) on leafless stems, simply racemose or nearly so, 9--25 cm long, the primary axis 0.6--0.8 mm diam, the flowers disposed either 1--3 together in sessile glomerules or both sessile and elevated on short secondary axes less than 2.5 mm long; flower  $\sigma$ : sepals 6, "green" when fresh, densely minutely strigulose externally, glabrous within, the outer 3 broadly deltate-ovate  $\pm 0.5$ --0.9 X 0.4--0.5 mm, the inner 3 broadly deltate to ovate-suborbicular 2--2.5 X 1.8--2.5 mm; androecium 1.5 mm long, the tubery claviform, densely spinulose-papillate filaments united at extreme base,

thence free, strongly incurved distally and connivent, the 3 outer ones 0.5--0.6 mm wide at apex, bearing the collateral anther-sacs introrsely, tilted over to bring the dehiscence-slit to horizontal, the 3 inner ones slightly less incurved, bearing the anther-sacs laterally separated by a narrow connective, the dehiscence-slit, because less tilted, appearing oblique; inflorescence 0 up to 6--8 cm long, loosely racemose, the fruiting pedicels 4--9 mm long, 2--3 mm diam; drupe obliquely oblong-ellipsoid, 2.8--3.8 cm long, 1.8--2.2 cm in greatest diameter, the mealy-coriaceous, glabrous or at least eventually glabrate exocarp dotted with pallid lenticels, 0.6--0.7 mm thick in section, the mesocarpic pulp thin, scarcely fibrous, deciduous in papery pieces when dry; endocarp up to 3.2 X 1.9 cm, the stiffly coriaceous testa deeply sculptured, the long outer curve traversed by 3 open grooves  $\pm 2$  mm wide and 1 mm deep and separated by stout corrugated ridges up to 2--3 mm wide and 1--1.5 mm thick in section, the sides of the endocarp also deeply and sinuously engraved.

Peru: San Martín: Mariscal Cáceres, Tocache Nuevo, en bosque alto, Jose Schunke Vigo 1971/34 (NY-holotype, in fl.), 1971/33 (NY-paratype, in fr.). Ecuador: Los Ríos: Hacienda Clementina on Rio Pita, Erik Asplund 5463 (S).

In shape, texture, and venation of leaf-blades A. fluminum suggests the sympatric A. pahni, but differs in pubescence, and in important details of the staminate inflorescence, the androecium, and the drupe. The staminate flowers of A. pahni are borne in well-furnished cymules elevated on secondary branchlets; the vesture of the leaves is composed of more or less erect, setiform hairs; the drupe is small, smooth externally (non-lenticillate), and its endocarp is only shallowly sculptured. The androecium of A. pahni is glabrous, and the anther-sacs are erect, extrorse, and vertically dehiscent. In A. fluminum the staminate flowers are borne either 2--3 together directly at nodes of the primary axis or these may be paired with an abbreviated 1--3-flowered branchlet; the vesture of the leaves is minute, truly appressed; and the drupe large, lenticellate externally, while its endocarp is deeply and coarsely engraved with three wide grooves separated by broad thickened ribs running the whole length of its long outer curve. The androecium is entirely different, papillate all over, some papillae (under X 30) appearing spinulose and up to 0.1 mm long, while the distally dilated, club-shaped filaments are tilted inward at apex, bringing the anther-sacs nearly horizontal to the flower's axis. The sacs of the three outer stamens are collateral and introrse, their horizontal slits coalescent in age; those of the three inner stamens are separated by a narrow connective, therefore latero-introrse, and slightly less strongly tilted, the slits appearing oblique in consequence.

Because of the large size and externally lenticellate surface of the drupe, A. fluminum must be compared also with A. aristeguietae, described from Venezuela but known also (from fruiting material) to occur in Peru. Flowers of A. aristeguietae are, unhappily, still unknown, but the incomplete material is easily distinguished from A. fluminum by the soft, erect pubescence of the undersurface of the leaf-blades and by the interior structure of the fruit. The endocarp of A. fluminum, as already mentioned, is exceptional for the coarseness and depth of its engraved sculpture, and is surrounded by a thin, scarcely fibrous pulp which peels more or less cleanly from the testa when soaked. The testa of A. aristeguietae, equally in Venezuela and Peru, is only moderately engraved, lacks the wide and deep grooves around the long outer curve, and is clothed in a densely fibrous, tow-like pulp which can only be removed by laborious scraping. The pistillate raceme of A. fluminum is loose and open and the fruits are borne on well-developed pedicels. A striking feature of A. aristeguietae is the very short, crowded pistillate inflorescence, and the reduction of the fruiting pedicel to a stout neck no longer than wide. It seems likely that the staminate inflorescence of A. aristeguietae, when discovered, will provide even more decisive differential characters.

This species cannot be introduced easily into our regional keys to Abuta, partly because it occurs on both slopes of the Andes, in Ecuador and Peru. It might be sought in Key B, if this is extended south from Pacific Colombia to adjoining Ecuador. Here it would key to A. racemosa, from which it differs in the hispidulous androecium and the large, lenticellate drupe. In Key E, covering the Amazon Basin, A. fluminum would key, with some difficulty, to A. solimoesensis, from which also it differs in the characters just mentioned.

The collector states on the labels of Schunke 1971/34 and 1971/33: "el tallo es aredondeado, en la parte exterior de color negruzco, y en la interior de color amarillenta, con sabor amargo".



Abuta fluminum, flower ♂: 1) flower; 2) outer sepal; 3) inner sepal (ventral view); 4) androecium. (Schunke 1971/34)

14. Abuta selloana Eichler, Flora 47:389. 1864.

Brazil: São Paulo: J. Mattos 13922 (SP); Paraná: G. Hatschbach 16661; Santa Catarina: Reitz & Klein 4128 (US), Reitz 1901 (HBR), Klein 6994 (RB), Klein & Souza 7483 (RB).

15. Abuta panurensis Eichler, Flora 47:390. 1864.

Brazil: Amazonas: basin of the lower Rio Negro, Herb. Schwacke 3461 (18/6-1882) (JBRJ #53656), Krukoff 12104, France et al. 14973 (Rio Quieras), 11575 (near Manaus). Peru: San Martín: Mariscal Cáceres, Tocache Nuevo, Schunke 4741 (F).

This is the new record of the species for Peru.

16. Abuta solimoesensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):18. 1970.

Peru: San Martín: Mariscal Cáceres, Tocache Nuevo, Schunke 1971/31, 3795, 4638, 5183, 5185.

17. Abuta velutina Gleason, Bull. Torrey Club 58:361. 1931.

Brazil: Amazonas: basin of Rio Negro, between Rio Quinini and Moreira, France et al. 15185.

18. Abuta obovata Diels, Notizbl. Bot. Gart. Berlin 13:29. 1936.

Venezuela: Bolívar: "entre los brazos del Río Uei, Steyermark et al. 104578. Brazil: Acre: Cruzeiro do Sul, France 12437.

This is the new record of the species from the State of Acre.

20. Abuta brevifolia Krukoff & Moldenke, Bull. Torrey Club 69(2): 160. 1942.

Venezuela: Amazonas: basin of Río Negro, Froes 12387. Brazil: Pará: basin of Rio Jarí, N. T. Silva 3432; Amazonas: basin of Rio Negro, France et al. 11627 (capoeira, near Manaus); Acre: basin of Rio Jurua, Cruzeiro do Sul, France et al. 12121, 12615.

Excellent staminate inflorescences and flowers recently became available to us: staminate inflorescence arising from young leafy branches, solitary or serial by 2s and 3s, narrowly cymose-paniculate, loosely strigulose throughout with grayish or partly brownish hairs, the simple primary axis (0.6) 1--2.5 dm long, scarcely 1 mm diam at base, the secondary axes ascending, rather distantly disposed by 1--3, sometimes appearing pseudo-verticillate, up to 10 (12) mm long, the longer pedicels at anthesis 1--2 mm long; sepals strigulose externally, the 3 outer ±0.5 mm long, subulate, the 3 inner suborbicular, 1--1.2 X 0.8--1.1 mm,

subcarnose, glabrous within; androecium 6-merous, appearing glabrous but microscopically papillate at X 20, the filaments all free to base, 0.6--0.7 mm long, inversely pyriform in laterally view view but somewhat compressed laterally, the prominent anther-sacs latero-extrorse, 0.2 mm long, dehiscent by vertical slit. (Prance 12615-NY).

The inflorescence resembles that of related D. obovata, but the androecium consists of six, free filaments all essentially uniform in shape. The androecium of D. obovata consists of 3 outer, narrow and sterile filaments surrounding a united synandrium of 3 inner fertile ones.

This is the first record of the species from Venezuela also from the States of Amazonas and Acre, Brazil.

21. Abuta sandwithiana Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):18. 1970.

Brazil: Amazonas: Maues, terra firme, Froes 33192 (IAN); Acre: basin of Rio Jurua, Cruzeiro do Sul, Prance et al. 12461 (varzea).

This is the new record of the species from the State of Acre.

24. Abuta racemosa (Thunberg) Triana & Planchon, Ann. Sci. Nat. IV. 17:48. 1862.

Panama: Canal Zone: Barro Colorado Island, Croat 9233, 15053.

25. Abuta panamensis (Standley) Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):22. 1970.

Belize: near Mafridyle Lagoon, Percy H. Gentle 7714 (IL). Honduras: Copan: wet thickets along Copan River, alt. 700 m, Molina & Molina 24713.

27. Abuta grandifolia (Martius) Sandwith, Kew Bull. 1937:397. 1937.

French Guiana: Oldeman 1483 (CAY) (creek de la Folie), 1926 (CAY) (creek Gabaret), B-2320 (CAY) (River Sinnamary), 2191 (CAY) and 2197 (CAY) (River Iracoubo), 2766 (CAY), B-2116 (CAY), T-163 (CAY), 2980 (CAY), B-1830 (CAY), B-2189 (CAY) and De Granville 40 (CAY) (all from the basin of Approuague), Oldeman T-360 (CAY) and B-2500 (CAY) (Basin of Oyapock). Brazil: Amazonas: W. Rodrigues 8711 (INPA) (Estrada Manaus-Itacoatiara, km 69), 8855 (INPA 28070) (near Manaus), Prance et al. 11557 (near Manaus), 15714 and 16005 (basin of the upper Rio Negro), 13948 (basin of Rio Purus, vicinity of Labrea); Acre: basin of Rio Jurua, Cruzeiro do Sul, Prance et al. 12116, 12781; Terr. Roraima: Prance et al. 10656. Mato Grosso: R. M. Harley et al.

10426, 11209 (K), J. A. Ratter et al. 937, 1205, 1760 (K).  
 Peru: Poeppig s.n. (BM); San Martin: Mariscal Cáceres, Campañilla, Schunke 4246 (F). Colombia: Putumayo: Robin B. Foster 1565 (COL).

The collections from French Guiana are all from small shrubs up to  $4\frac{1}{2}$  m high occurring in the understory of high forest as well as on savana.

VIII. ANOMOSPERMUM Miers in Ann. Nat. Hist. III,  
 14:101. 1864.

3. Anomospermum bolivianum Krukoff & Moldenke, ex Moldenke,  
Lilloa 5:234. 1940.

Brazil: Pará: cult. at Ipean: N. T. Silva 3431.

The cited collection is from the same plant as N. T. Silva 843 cited in 8th Suppl. The plant was raised from seeds brought by J. Murça Pires from the basin of Rio Tapajos (Pires 4023 cited in 6th Suppl.).

- 4b. Anomospermum chloranthum Diels ssp. confusum Krukoff &  
 Barneby, Mem. N. Y. Bot. Gard. 22(2):69. 1971.

French Guiana: "forêt humide semperv. sur Mgne Boeuf-Mort, Oldeman 3231 (CAY). Peru: Huánuco: Pachitea, Honorio, alt. 300/400 m, Schunke 2545 (F); Loreto: near Pongo de Manseriche, Tessmann 4689 (G).

This is the first record of this subspecies from French Guiana.

- 4c. Anomospermum chloranthum Diels ssp. isthmicola Krukoff &  
 Barneby, Mem. N. Y. Bot. Gard. 22(2):70. 1971.

Panama: Darien: 1-5 miles downstream from El Real, Duke 4929.

- 5a. Anomospermum reticulatum (Martius) Eichler ssp. reticulatum,  
 Mem. N. Y. Bot. Gard. 22(2):73. 1971.

Brazil: Amazonas: basin of Rio Amazonas, Tefe, Ilha de Miua, Byron 226 (8/4-1970) (INPA 28087); basin of Rio Japura, Byron 333 (18/4-1970) (INPA 28194); basin of Rio Purus, Lago do Mapon-gapa, France et al. 2562; basin of Rio Negro: Martius s.n. (1864) (L); Territory of Rondonia: basin of Rio Madeira, France et al. 6580. Mato Grosso: Rio Suia Missu, R. M. Harley & R. Souza 11132.

This is the first record of the species from the State of Mato Grosso.

- 5b. Anomospermum reticulatum (Martius) Eichler ssp. dielsianum (Moldenke) Krukoff & Barneby, Mem. N. Y. Bot. Gard. 22(2): 74. 1971.

Brazil: Acre: basin of Rio Jurua, Cruzeiro do Sul, France et al. 12562.

This is the first record of the species from the State of Acre.

- 5c. Anomospermum reticulatum (Martius) Eichler ssp. glabrescens Krukoff & Barneby, Mem. N. Y. Bot. Gard. 22(2):74. 1971.

Venezuela: Tachira: La Fria, A. L. Bernardi 7664 (VEN).

This is the first record of this subspecies from Tachira.

- 5h. Anomospermum reticulatum (Martius) Eichler ssp.

Habit of subsp. reticulatum but reticulation of leaf-blades fine and almost fully immersed in the epidermis, the larger areoles  $\pm 0.2$ -- $0.25$  mm diam; fruiting peduncles 1-- $1.5$  cm long, at middle  $0.8$ -- $1$  mm diam; drupe (immature) apparently like that of ssp. nitidum in size and in sculpture of endocarp, much smaller than that of ssp. reticulatum at the same stage of maturity, the testa externally foveolate, internally armed around its long curve with a narrow intruded wing and on each side with two rows of small introverted prongs.

Peru: Huanuco: southwestern slope of the Rio Llulla Pichis watershed, on the ascent of Cerros del Sira (in rain forest, c.  $1290$  m,  $9^{\circ} 26'$  S,  $74^{\circ} 45'$  W), Frank Wolfe 12339 (F), 12340 (F).

An interesting record for A. reticulatum sensu lat., the first from sub-Andean Peru, and doubtless representing an undescribed entity, but known only from material with immature drupes. The specimens introduce into A. reticulatum no morphological character not previously recorded in the species, but are marked by an unforeseen syndrome. The finely reticulate leaf-blades, almost as smooth on the upper face as those of Orthomene schomburgkii, recall those of the Venezuelan ssp. venezuelense but the drupe is evidently much smaller, less deeply rugulose but foveolate externally, and armed within by rows of introverted prongs. The sculpture of the endocarp is much like that seen in subsp. idroboi of sub-Andean Colombia or subsp. nitidum of southeastern Brazil, but both of these have coarsely reticulate leaf-blades. It is not possible to foretell from the material at hand the ultimate size of the drupe, but it seems likely to fall within the relatively small range characteristic of subsp. nitidum, certainly below the average size of subsp. reticulatum or subsp. idroboi.

6. Anomospermum steyermarkii Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):30. 1970.

Brazil: Terr. Roraima: vicinity of Uaiçá airstrip, France 10809.

7. Anomospermum matogrossense Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20:33. 1970.

Brazil: Para: Portel, região do Anapu, Froes 32948 (BM, SP, IAN).

IX. ORTHOMENE Barneby & Krukoff, Mem. N. Y. Bot. Gard., 22(2):79. 1971.

1. Orthomene schomburgkii (Miers) Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2):80. 1971.

Venezuela: upper Orinoco: Lizot 76A (VEN), Surinam: Toekoe-moetoe Creek, Daniels A. G. H. & F. P. Yonkers 1338. French Guiana: Oldeman 1515 (CAY) (south of Cayenne), B-2844 (CAY) (basin of the lower Approuague), T-283 (CAY) (basin of Rio Oyapock), R. Schnell 12126 (P) (près de Saut Macaque). Brazil: Amazonas: basin of Rio Negro, France et al. 15215 (between Ilha Uabetuba and Ilha da Silva). Peru: Huanuco: Schunke 6545 (F); San Martín, Mariscal Cáceres, Tocache Nuevo, Schunke 1970/29, 3890, 4441, 4561 (F).

2. Orthomene verruculosa (Krukoff & Barneby) Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2):81. 1971.

Abuta verruculosa Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20:24. 1970.

Slender high-climbing vines, to 20 m long, the upper stems channeled, sparsely lenticellate, up to 5 mm diam, either glabrous to the inflorescence and drupe or the younger branchlets or lower surface of leaf-blades (or both) finely puberulent with minute, forwardly appressed hairs up to 0.1-0.15 mm long; petiole slender, (2) 4-14 cm long, little inflated at either end; leaf-blade (dry) papery-submembranous, brownish-olivaceous above, lighter brown beneath, plane or somewhat wrinkled but not bullate, the margins revolute, in outline ovate, ovate-oblong, or subobovate, at base either broadly cuneate or truncate-subcordate, at apex short-acuminate (the acumen either acute or obtuse), 8.5-30 cm long, 4-15 cm broad; primary venation of blade of 3 or 5 nerves from exact base, the outer pair (when present) weak and short, submarginal, attaining less than 1/3 length of blade, the inner pair incurved-ascending beyond middle of blade, the costa giving rise at and beyond middle to 2-3 pairs of major incurved-ascending, and throughout its length to many minor, subtransversely divaricate secondaries, these all prominulous beneath, the tertiary venation slender and open,

immersed above, the areoles beneath much  $\pm 1$  mm diam; inflorescence  $\emptyset$  cauliflorous supra-axillary sessile, densely cymose-glomerulate, the flowers crowded into a depressed hemispherical cluster, the axes after fall of the flowers becoming woody-persistent; flower  $\emptyset$  sessile or nearly so: sepals 6--9 (probably 6 but closely subtended by 1--3 similar bracteolar scales), delicate-ovate obtuse concave, all externally pilosulous with short spreading-ascending hairs, the outermost submembranous 0.7--2 mm long and about as wide, the inner (in vernation imbricate) sub-carnosulous 1.7--3 mm long; petals 6, flabellate-subtruncate, not fleshy-thickened, 0.35--1.2 mm long, their inflexed margins loosely embracing the opposed filament; androecium glabrous, the 6 filaments all free from base, broadly linear, about as long as opposed petal, at apex abruptly incurved, the anther-sacs almost round 0.3--0.45 mm long, introrsely collateral but separated abaxially by a narrow connective, tilted forward so that the dehiscence-slit becomes obliquely horizontal to the flower's central axis; inflorescence  $\emptyset$  borne in axils of fallen leaves, sessile or subsessile, cymosely 7--9-flowered, not seen at anthesis, the flowers apparently short-pedicellate, the fruiting fertile pedicel becoming 3--5 mm long, 2--2.5 mm diam, puberulent; perianth  $\emptyset$  not seen; drupe subsymmetrically oblong-ellipsoid, 25--28 X 11--13 mm, apiculate by the terminal or obliquely terminal style-base, scarcely compressed laterally, the fleshy, when ripe orange-yellow exocarp drying blackish and intricately verruculose-wrinkled, apparently  $\pm 0.5$  mm thick when fresh and separated from the endocarp by a layer of watery non-fibrous mesocarp; endocarp 22--25 X 9--10 mm, the testa thinly crustaceous 0.3--0.5 mm thick in section, externally shallowly incised-reticulate, the internal face undulate but otherwise unarmed.

French Guyana: basin of Rio Oiapoque (fleuve Oyapock), left bank of Oyapock at Moutouci Fall, frts. in May, 1970, Oldeman T-712 (CAY); left bank of river Yaroupi at Tainoua Fall, frts. in Apr., 1970, Oldeman T-550 (CAY), de Granville 428 (CAY). Brazil: Amapa: basin of Rio Oiapoque,  $\pm 5$  km s.w. of mouth of Rio Ingarari, fl.  $\emptyset$  in Sept., 1960, Irwin, Pires & Westra 48358 (IAN, K, NY). Colombia. Vaupes: Rio Inirida, alt. 200 m, frts. in Feb., 1953, Fernandez 2313 (COL) (type of Abuta verruculosa).

Described as a high-climbing, slender-stemmed liana (Irwin et al.), up to 10--20 m long, woody at base, climbing by means of twining terminal stems (de Granville); the ripe fruits sub-cylindric, orange (de Granville) or yellow (Oldeman); the staminate flower yellowish-brown (Irwin et al.).

The discovery along the Amapa-French Guiana boundary of three fruiting collections of the recently described O. verruculosa is not only of exceptional phytogeographic interest but has enabled us to recognize in a hitherto enigmatic staminate flowering plant collected in the same region the male counterpart of a unique species. The new material of O. verruculosa,

known hitherto from a single pistillate plant collected in Vaupes, Colombia, expands our knowledge of its species so greatly that we believe it proper to present a revised and amplified description embodying all data now at hand.

The fleshy, when dry elaborately wrinkled and thereby apparently warty drupe of the plants from the Oiapoque (on the French bank called Oyapock) River and its tributaries are identical with that of the Colombian typus. The plants of the two areas differ slightly in that the one example from Colombia is glabrous except for the inflorescence and drupe, whereas those from Guiana have young stems (sometimes) and leaf-blades beneath (always) finely puberulent with minute, forwardly appressed hairs. The latter show also a greater variation in size of leaf-blade than could be foreseen from study of the Colombian typus, but we interpret the variation in amplitude and in pubescence as trivial and of no taxonomic significance. The puberulent leaf-type associated with the characteristic drupe is matched very closely by the staminate plant collected on the Brazilian bank, with this slight further difference, that the acumen of the leaf blade is obtuse rather than triangular-acute as in all other plants studied. Here again we believe the difference inconsequential. The staminate inflorescence of O. verruculosa turns out to be a good counterpart to the pistillate one, which is unique in Orthomene by being sessile and cymulose. At anthesis the staminate inflorescence forms a depressed hemisphere of closely crowded flowers sessile above the axil of fallen leaves. After the flowers are shed the axes become indurated and persist on the old stems in the form of corky burls. The pistillate inflorescence, not known at anthesis, is similarly organized but (as usual in the family) simpler than the staminate one, composed of about 7 or 9 flowers of which only one or two bear fertile fruits, these by abortion of two of the three carpels appearing solitary.

The individual staminate flower of O. verruculosa marks a departure from what has been thought normal in the genus, the perianth being of submembranous texture, not at all fleshy-thickened as in the generitype, O. schomburgkii, and the petals not crowded into a button-like pseudodisk. Moreover the filaments are abruptly incurved at apex so as to tilt the anthers forward, the structurally vertical dehiscence-slit becoming in consequence obliquely horizontal to the axis of the flower. These features which are shared by no other Orthomene are the very ones that distinguish, in the related genus Anomospermum, a subgenus Elissarrhena, and if we had nothing to base our classification upon other than the male sex, O. verruculosa would fit neatly into subgenus Elissarrhena, just as O. schomburgkii would fit into subgenus Anomospermum. Basing our classification primarily on the organization of the seed, we interpret O. verruculosa, like the members of Anomospermum sect. Elissarrhena, as having retained a relatively primitive (unspecialized) staminate inflorescence and individual staminate flower while other mem-

bers of each genus have developed a simplified cyme and a fleshy perianth by parallel evolution. Insofar as O. verruculosa now stands in the same relation to the remainder of its genus as does subgenus Elissarrhena to subgenus Anomospermum, it will probably deserve eventually to figure as typus of a subgenus of Orthomene. We prefer to wait until the still lacking staminate inflorescence of O. prancei can be studied before taking any step in this direction.

### Changes in the identifications

	Cited originally as	Cited later as
Krukoff 12104 (sterile)	<i>Abuta grandifolia</i> (4:159)	<i>Abuta panurensis</i> (9th Suppl.)
Froes 12387 (sterile)	<i>Abuta grandifolia</i> (5:403)	<i>Abuta brevifolia</i> (9th Suppl.)
Mathias & Taylor 5022 (sterile)	<i>Telitoxicum</i> <i>krukovii</i> (7a:47)	<i>Telitoxicum peruvianum</i> (9th Suppl.)
Froes 12423 (sterile)	<i>Abuta negroensis</i> (5:400)	<i>Telitoxicum negroense</i> (9th Suppl.)

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(In order to conserve space, we are citing here only papers not cited in Supplement VI).

- 7a. Krukoff, B. A. & R. C. Barneby. Supplementary notes on American Menispermaceae. VI. Mem. N. Y. Bot. Gard. 20(2): 1-70. 1970.
- 7b. \_\_\_\_\_ & \_\_\_\_\_. Supplementary notes on American Menispermaceae. VII. Mem. N. Y. Bot. Gard. 20(2):71-80. 1970.
- 7c. \_\_\_\_\_ & \_\_\_\_\_. Supplementary notes on American Menispermaceae. VIII. A generic survey of the American Triclisieae and Anomospermeae. Mem. N. Y. Bot. Gard. 22(2):1-90. 1971.

SUPPLEMENTARY NOTES ON THE AMERICAN SPECIES  
OF STRYCHNOS. XII.

B. A. Krukoff<sup>(1)</sup>

Since the last serial paper (Supplement XI) was published 55 new collections were examined. These collections extend our knowledge of many species previously known from incomplete material. Extensions of ranges are reported for 9 species and one species, S. schunkei, is described as new. The chemical studies of bark of various species by Prof. Marini Bettolo and his associates continued. For the recent findings see under S. romeu-belenii.

3. Strychnos colombiensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 12(2):21. 1965.

Peru: Huanuco: Leoncio Prado, Dtto. Rupa Rupa, al oeste de Tingo Maria, en bosque alto, terreno con rocas calcáreas y con mucha sombra, alt. 680-700 m, Schunke 5135 (flrs. Nov. 23).

This is the first record of the species from Huanuco. (It has been known previously only from Cuzco). The collector states on the label: "liana 18-20 m".

5. Strychnos romeu-belenii Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(1):22. 1969.

In 11th Supplement (7e:234) we already reported on the isolation of a new indolinic alkaloid which has been isolated by Prof. Marini Bettolo and associates from the stem bark (Romeu Belem 3504) to which the structure of 11-methoxy-diaboline has been assigned. In the paper which has now appeared in print it is stated that it is most unusual for American spp. of Strychnos to have only one alkaloid present in large quantity. Usually they contain very complex alkaloid mixtures.

6. Strychnos rondeletioides Spruce ex Benth, Jour. Linn. Soc. 1:104. 1856.

French Guiana: basin of Rio Oyapock, Oldeman & Sastre 293 (P). Brazil: Amazonas: basin of Rio Purus, Rio Ituxi, Prance et al. 13865 (20 km above mouth), 13961 (vicinity of Labrea). Colombia: Vaupes: bank of Rio Kubiya, Soejarto & Lockwood 2425 (COL).

This is the first record of the species from the basin of Rio Purus.

---

(1) Consulting Botanist of Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey.

7. Strychnos macrophylla Barbosa Rodrigues, Vellozia, ed. 2, 1:33, pl. 2, fig. A. 1891.

Brazil: Amazonas: basin of Rio Negro, vicinity of Manaus, France et al. 11539.

10. Strychnos brachiata Ruiz & Pavon, Fl. Per. 2:30. 1799.

Peru: San Martin: Mariscal Cáceres, Dtto. Tocache Nuevo, Schunke 5018, 5021.

Schunke 5021 is in flower and the other collection is in fruit. These collections are of considerable interest as they establish the first definite locality in Peru. We do not know where Ruiz & Pavon Peruvian specimens of this species were collected.

12. Strychnos panamensis Seemann, Bot. Voy. Herald 166. 1854.

Mexico: Jalisco: Villarreal da Puga 2935 (ENCB). Panama: Canal Zone: Barro Colorado Island, Croat 15073. Venezuela: Tachira: La Fria, Bernardi 7687 (VEN); Apure: Steyermark et al. 101681 (VEN), Mondolfi s. n. (Herb. #82474) (VEN).

This is the first record of the species from the State of Jalisco, Mexico and from the State of Tachira, Venezuela.

13. Strychnos tabascana Sprague & Sandwith, Kew Bull. 1927:128. 1927.

Mexico: Veracruz: mun. Totutla, F. Ventura A. 2984 (ENCB), 3548 (ENCB), 3554 (ENCB); Tabasco: Villahermosa, Comisión de Dioscórea 2721 (ENCB), 3704 (ENCB). Honduras: Copan: 2 km east of Copan Ruins, Molina & Molina 24800.

24. Strychnos jobertiana Baillon, Adansonia 12:367. 1879.

Brazil: Acre: basin of Rio Jurua, Serra do Moa, France et al. 12690.

This is the first record of the species from the State of Acre.

25. Strychnos pseudo-quina A. St. Hilaire, Mem. Mus. Paris 9: 340. 1822.

Brazil: São Paulo: munic. Botucatu, alt. 550 m, cerrado, Ilse S. Gottsberger s. n. (11/2-71), 6591 (22/4-71).

28. Strychnos solimoesana Krukoff, Brittonia 4:280. 1942.

Brazil: Amazonas: basin of Rio Purus, Rio Apitua, tributary of Rio Purus, France et al. 13929.

Local names: "Ira" (Jamamadi Indians). Prance notes on the label: "Vicinity of Jamamadi Indian village, capoeira, shrub with arching scandent branches. Bark used as principal ingredient in arrow and blow-gun dart poison, mixed with Curarea toxicofera (Prance et al. 13931) ("Bicava"), Guatteria cf. megalophylla Diels (Prance et al. 13936) ("Boa"), and Fagara sp. (Prance et al. 13937) ("Balala").

This is the first record of the species from the basin of Rio Purus.

29. Strychnos froesii Ducke, An. Acad. Bras. Ci. 23:209. 1951.

Brazil: Amazonas: basin of Rio Negro, Rio Cuieras, forest on terra firme, Prance et al. 14962.

31. Strychnos peckii B. L. Robinson, Proc. Amer. Acad. 49:504. 1913.

Brazil: Mato Grosso: Harley 10842 (K) (12°49'S., 51°46'W., gallery forest), R. R. de Santos & R. Souza 1753 (K) (Rio Suiazinha, 290 km N. of Xavantina).

32. Strychnos erichsonii Richard Schomburgk, Reisen 3:1082, hyponym. 1848; Mart. Fl. Bras. 6(1):274. 1868.

Venezuela: Jacques Lizot 106 (VEN). Peru: San Martín: Mariscal Cáceres, Tocache Nuevo, Jose Schunke V. 4740 (F).

36a. Strychnos mitscherlichii Richard Schomburgk, Reisen 2:451. 1848, var. mitscherlichii.

Venezuela: Bernardi 7230 (VEN), 7339 (VEN).

36b. Strychnos mitscherlichii var. pubescentior Sandwith, Brittonia 3:91. 1938.

Brazil: Amazonas: basin of Rio Purus, Rio Ituxi, Prance et al. 14331. (Rio Curuquete, vicinity of cachoeira São Bento).

This is the first record of this variety from the basin of Rio Purus.

37. Strychnos solerederi Gilg, Bot. Jahrb. 25 (Beibl. 60):40. 1898.

Peru: San Martín: Mariscal Cáceres, Dto. Tocacho Nuevo, Schunke 4562.

This is the first record of this species from Peru.

39. Strychnos guianensis (Aublet) Martius, Syst. Mart. Med. Bras. 121. 1843.

Venezuela: Amazonas: Blanco 1085 (VEN). Brazil: Amazonas: basin of Rio Negro, Prance et al. 11617 (vicinity of Manaus), 15549 (Rio Uneiuxi, flooded savanna forest); Acre: basin of Rio Jurua, Cruzeiro do Sul, Prance et al. 12743. Peru: Huánuco: Leoncio Prado, Dtto. Rupa Rupa, Schunke 5216.

40. Strychnos glabra Sagot ex Progel, Mart., Fl. Bras. 6(1): 275. 1868.

French Guiana: Monte Atachi Bacca, de Granville B3847 (P).

41. Strychnos subcordata Spruce ex Bentham, Jour. Linn. Soc. 1: 106. 1856.

Brazil: Amazonas: basin of Rio Negro, vicinity of Manaus, Prance et al. 11578.

43. Strychnos panurensis Sprague & Sandwith, Kew Bull. 1927:132. 1927.

Brazil: Acre: basin of Rio Jurua, Aldeota between Poranguba and Papagaio, forest on terra firme, Prance et al. 13099, 13131.

52. Strychnos oiapocensis Froes, Bol. Técn. Inst. Agron. Norte 36:143. 1959.

French Guiana: Monte Atachi Bacca: de Granville 753 (P).

The specimen (Oldeman 2614) deposited at P has a weak solitary tendril opposed to a developed leaf. We previously thought that it was devoid of tendrils and spines.

53. Strychnos fendleri Sprague & Sandwith, Kew Bull. 1927:129. 1927.

Venezuela: Lara: R. F. Smith V4260 (VEN).

55. Strychnos rubiginosa DC., Prodr. 9:16. 1845.

Brazil: Paraná: campo cerrado 3 kms N of Campo Mourão, Lindeman & de Haas 4497.

65. Strychnos mattogrossensis S. Moore, Trans. Linn. Soc. II. 4:392. 1895.

Venezuela: Tachira: La Fria, A. Bernardi 7697 (VEN).

This is the first record of the species from Tachira.

69. Strychnos poeppigii Progel, Mart. Fl. Bras. 6(1):282. 1868.

Brazil: Amazonas: basin of Rio Purus, Prance et al. 13474 (opposite Labrea, varzea), 16362 (between Botafago and Lago Quati, varzea).

70. Strychnos tarapotensis Sprague & Sandw., Kew Bull. 1927:131. 1927.

Peru: San Martin: Mariscal Caceros, Schunke 3495 (Dtto. Campanilla), Schunke 3986, 4007, 4332, 4765 (F), (Dtto. Tocache Nuevo); Huanuco: Schunke 2540 (Pachitea, Dtto. Honoria), 2900 (Pachitea, Dtto. Puerto Inca), 5134 (Leoncio Prado, Dtto. Rupa Rupa).

Local names: "Chijilla", "Chija", "Naranjilla".

All collections are from spiny shrubs 1 to 6 m tall of high forest.

71. Strychnos schunkei Krukoff & Barneby sp. nov.

S. tarapotensis Sprague & Sandwith affinis et cum eo inflor-  
escentia terminali, foliis fere glabris, corollaeque forma  
similis, sed imprimis foliorum lamina saltem duplo majori  
5--12.5 (nec 2.3--6) cm longa, 3.5--4 (nec 1--3) cm lata  
abstans.

Macroscopic: petioles about 2 mm long; blades narrowly el-  
liptic or elliptic-lanceolate (5) 7.5--12.5 cm long, 3.5--4 cm  
broad, narrowed at base, acuminate at apex, dull on both sur-  
faces and paler beneath, membranaceous to chartaceous, 3-ply-  
nerved with the inner pair opposite or alternate and diverging  
at 4--9 mm from base, reticulation obscure or faint on both sur-  
faces. Microscopic: branchlets, petioles and blades are essen-  
tially glabrous in all parts; leaf-blades not verrucular above  
or beneath, not barbate and usually without a membranaceous poc-  
ket beneath in axils of the inner principal nerves.

Inflorescence terminal, the puberulent peduncle less than 1  
cm long, compactly cymose, at young anthesis hemispherical, 1.7  
cm diam; pedicels of outer flowers of each cymule up to 0.5 mm,  
the central flower subsessile; calyx glabrous externally, ±1 mm  
long, the broadly deltate-ovate, minutely ciliolate lobes up to  
0.7 mm long; corolla 2.6 mm long, glabrous externally except for  
papillate margins of lobes, the tube ±1.2 mm long, glabrous in-  
ternally, the ovate-triangular lobes ±1.4 mm long, thinly bar-  
bate in an ascending arc internally; filaments glabrous 0.5 mm  
long, inserted just below the sinuses of corolla-lobes; anthers  
0.8--0.9 mm long, the sacs minutely hispidulous at base.

Peru: San Martin: camino a Porongo (Uchiza), 450 m alt.,  
Jose Schunke V. 5763 (NY-holotype).

Shrub 2 m high, collected on Jan. 20, 1962 and devoid of  
 tendrils or spines.

Of 22 known species of sect. Breviflorae 10 species (S. fendleri, S. atlantica, S. rubiginosa, S. fulvotomentosa, S. acuta, S. brasiliensis, S. grayi, S. brachistantha, S. nigricans and S. cerradoensis) do not occur in the Amazon basin and of these only S. acuta resembles somewhat S. schunkei in its vegetative characters.

S. parviflora is immediately distinguished from S. schunkei as it has axillary inflorescences; S. poeppigii, S. schultesiana and S. malacosperma--as their calyx-lobes are linear-lanceolate, 2.5--3 mm long and glabrous; S. castelnaeana and S. progeliana--as their leaves beneath are densely pubescent; S. parvifolia--as its leaf-blades are conspicuously verrucular on nerves and veinlets and often subciliate; S. pachycarpa and S. neglecta--as their corolla-tubes are equal or longer than corolla-lobes; S. oiapocensis--as its inflorescences are congested and in spherical clusters even at anthesis; S. mattogrossensis--as its calyx-lobes are lanceolate to ovate-acuminate, 0.9--1.5 X 0.4--0.5 mm, corolla-tube 0.75--0.9 mm, anthers 0.55--0.6 mm long, leaf-blades beneath usually with membranaceous pockets in axils of the inner principal nerves and as it is a woody vine provided with tendrils and spines.

S. schunkei is related to S. tarapotensis from which it is immediately distinguished by much larger leaf-blades (they are 2.3--6 cm long and 1--2.8 cm broad) and usually have rather large membranaceous pockets beneath in axils of the inner principal nerves in the latter species).

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## BOOK REVIEWS

Alma L. Moldenke

"GARDENING ANTS: THE ATTINES" by Neal A. Weber, xvii & 146 pp., illus., The American Philosophical Society (Memoirs Volume 92), Philadelphia, Pennsylvania 19106. 1972. \$8.00.

The New World tribe Attini of subfamily Myrmicinae includes 12 genera with 180 to 200 species and at least 80 subspecies which are recognized by distinctive physical characteristics and even more so by their unique fungus-raising ability on the leaf-cuttings carried by them into their nests. This unique food supply is carried to new nests by the queens as balls of mycelia in their infrabuccal pockets. These cultures are nourished by ant feces and saliva, usually kept free of fungal and other contaminants chemically as well as physically, and regularly nibbled in lawnmower fashion to the vexation of mycologists who, lacking the diagnostic fruiting structures, can only guess their identity.

This excellent study treats these main topics: relation of gardening ants to man, body structure and function, classification and distribution, migration, mating and establishing colonies, life cycles, colonies and nests, foraging behavior, the fungus garden and ant fungi, 158 guests and parasites and predators, key to genera of attine workers, and distribution of the 85 North and Central American species. There is a valuable bibliography of 330 references including the author's first publications in this field back in 1937. The illustrations are outstanding.

So many different kinds of biologically inclined and/or trained people can profit from this study.

"A NATURALIST IN COSTA RICA" by Alexander F. Skutch, x & 378 pp., illus., University of Florida Press, Gainesville, Florida 32601. 1971. \$12.50.

"This book is a record [of most pleasurable reading!] of some of the more noteworthy observations, as well as some of the more memorable personal experiences [that readers, especially those of us fortunate enough to have visited this area, share vicariously], of a naturalist [of high calibre] who has spent forty years in wilder parts of tropical America, about thirty-five of them in Costa Rica." He established a homestead in Valle del General south of San Isidro which is today one of the largest remaining tracts of forest through his careful preservation. He chronicles the loss of its palmitos, agouti, birds, etc.

He pleads for the preservation of the remnant magnificent wilderness of the Cordillera de Talamanca as a national park. "Every nature preserve.....is but a temporary expedient to save something of the earth's pristine glory until the great fundamen-

tal problem is solved.

"This problem is the stabilization of the human population of our planet within rational limits."

An appendix lists over 300 bird species identified in this Valle del General with notes on habitats and changes in numbers and range noted over the years. Another appendix lists his many publications.

"BOTANY: AN ECOLOGICAL APPROACH" by William A. Jensen & Frank B. Salisbury, xi & 754 pp., illus., Wadsworth Publishing Company, Inc., Belmont, California 94002. 1972. \$13.95.

For decades the market in botany and biology texts has been glutted with miserably mediocre (or worse) word and diagram filled bookcovers. This is one of the very few that is genuinely excellent. It has the quality of the Raven and Curtis and the Cronquist texts for intelligible presentation of facts and stimulating development of scientific concepts. I would enjoy teaching a botany course with this text as the students' main source of content.

The chapters are organized into four main sections: (1) photo essays which are usually pictorially introductory, (2) core texts which explain, often in narrative style, the basic material and concepts, often adding material relevant to current problems and man's role in the ecosystem, (3) essays by present day botanists themselves about how some of their important ideas were developed or why they became botanists, and (4) end papers which allow students to pursue some ideas in greater depth.

The book is well printed, with very good black/white photographs and line drawings, and is thoroughly indexed. Ampule is misspelled on p. 345 and infinitives are split on pp. vi and 346. The wild einkorn is shown with an amazingly full grain head.

"THE NATIVE ORCHIDS OF FLORIDA" by Carlyle A. Luer, 295 pp., illus., The New York Botanical Garden, Bronx, New York 10458. 1972. \$25.00.

This wonderful book, designed primarily for amateur and professionally orchidophiles, is truly a labor of love on the part of Dr. Luer with his interesting introduction that appeals for the preservation of these beautiful plants in their uniquely attractive habitats, his carefully prepared text that has been checked by Dr. Rickett, his helpful line drawings of floral structure details, and his beautiful color photographs on 84 oversize plates. If you are familiar with Rickett's "Wild Flowers of the United States, volume 2, The Southeastern States" you will know the quality of the color plates and recognize some of them.

"Of the 102 species and varieties found occurring naturally in Florida, 63 migrate no farther north than the northern boundary of the state."

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Transfer of Aster gentryi Standl. to the genus Machaeranthera,  
sect. Psilactis

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During the fall of 1972 Dr. R. C. Jackson kindly called my attention to the name Aster gentryi Standl. (1940), which he took to be synonymous with Machaeranthera mexicana Turner & Horne (1964). Indeed, at the same time he informed me that he had made the transfer of the former to Machaeranthera; in confirmation of this he subsequently, at my request, sent me a reprint of the article (Trans. Kans. Acad. Sci. 71: 522. 1968) in which this combination purportedly appeared. And it does. But, unfortunately, in making this transfer, Jackson was apparently unaware of Article 33 of the International Code of Botanical Nomenclature (1972) which states that after 1 January 1953 a new combination is not validly published unless its basionym is clearly indicated and "a full and direct reference given to its author and original publication with page or plate reference and date." Jackson's combination fails to comply with the words quoted. I therefore make the appropriate combination here: Machaeranthera gentryi (Standl.) Jackson ex Turner - based upon Aster gentryi Standl., Field Mus. Pub. Botany 22: 60. 1940.

In spite of the fact that I was senior author of a recent study of the section Psilactis (Turner & Horne, 1964), I would not have bothered to write this article except that I disagree with Jackson's assessment of the nomenclature, for he states that "there are no discernable differences between Aster gentryi and Machaeranthera mexicana", concluding therefore that they are synonymous.

Machaeranthera gentryi, as surmized by Jackson, is undoubtedly closely related to M. mexicana, but I cannot agree with his conclusion that the two belong to the same species. The former would key ("involucre 6 - 8 mm high") to M. crispa in the treatment of Turner and Horne (1964), but the latter belongs to a Baja California element with affinities to the  $x = 5$  chromosomal line of the genus. Judging from morphology, M. gentryi presumably belongs to the  $x = 4$  line.

Machaeranthera gentryi is known only from the type locality (Memelichi, Rio Maya, Chihuahua) where it was found growing in a meadow margin in a transitional pine forest at 7500 feet.

Both the holotype (FM!) and isotype (US!) are incomplete specimens, i.e., the plants lack most of their stem and roots (the well developed flowering branches were apparently taken from a fairly robust plant) so that our knowledge of the variation is limited. However, in view of the geographical isolation of the type locality (on the western side of the Sierra Madre Occidentale; M. mexicana being widespread at more inland sites), and the very striking differences (Table 1) readily apparent on the two plants at hand, I do not hesitate to accord the taxon specific rank in the Machaeranthera (Psilactis) alliance.

Table 1. Salient Features Separating Machaeranthera gentryi and M. mexicana.

Character	<u>mexicana</u>	<u>gentryi</u>
1. Involucral bracts (length)	4-6 mm	6-8 mm
2. Involucre (diameter when pressed)	10-14 mm	16-20 mm
3. Ray florets:		
number	30-50	over 50
ligule length	6-10 mm	10-14 mm
4. Disc florets:		
number	50-100	over 150
corolla length	3.2-4.2 mm	4.5-5.0 mm
5. Pappus length	2.6-3.2 mm	4.0-4.5 mm
6. Inflorescence	branches short, strict	branches long, flexuous
7. Upper-most (reduced) leaves	narrowly amplate, scarcely cordate	broadly amplate, nearly cordate

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NEW TREE SPECIES FROM ESMERALDAS, ECUADOR  
(CONCLUDED)

ELBERT L. LITTLE, JR.

A new species from the Province of Esmeraldas in northwestern Ecuador in the genus Chrysophyllum L. (Sapotaceae) is published here. Notes on several other tree species of that area are added.

This article is the fifth and last with the same title (Phytologia 18: 195-208, 404-418, 457-472, illus. 1969; 19: 251-269, illus. 1970). The work was done under the forestry project, Desarrollo Forestal de Noroccidente (DEFORNO), Dirección General de Bosques, Quito, Ecuador. This was United Nations Special Fund Project No. 127, administered by the Food and Agriculture Organization (FAO) of the United Nations and the Government of Ecuador.

The new species were described and illustrated also in a book on the common trees of Esmeraldas, volume 4 of the final report of the project. This book on the common trees of Esmeraldas by Elbert L. Little, Jr., and Robert G. Dixon, "Arboles Comunes de la Provincia de Esmeraldas," has been published by the Food and Agriculture Organization (FAO) of the United Nations as: Estudio de Preinversión para el Desarrollo Forestal del Noroccidente, Ecuador, Informe Final Tomo IV, Arboles Comunes de la Provincia de Esmeraldas, Roma, 1969 [1970], 535 pág., illus. (FAO/SF: 76/ECU 13). Requests for this publication should be addressed to: FAO Documentation Center, Via delle Terme di Caracalla - 00100, Rome, Italy.

"Arboles Comunes de la Provincia de Esmeraldas" contains descriptions in Spanish and drawings of 230 common tree species of Esmeraldas, including all 20 new species described in this series of articles based upon specimens collected in 1965-1966. Also, 11 more tree species in this book were in my collection in 1943 with the forest survey of the Latin American Forest Resources Project, of the Forest Service, United States Department of Agriculture, and were named in my earlier article (New species of trees from western Ecuador. Wash. Acad. Sci. Jour. 38: 87-105, illus. 1948). Three additional species in the book were named by others from type specimens collected by the 1943 survey: Sorocea sarcocarpa Lanjouw et M. Boer, Swartzia littlei R. S. Cowan, Dacryodes cupularis Cuatr. Thus, 34 or more species of this book were proposed as new. About 20 of the 230 species described and illustrated still have not been identified to species. Some specimens are incomplete and inadequate for determination, while others are also in difficult groups, 9 in Lauraceae, one of the largest tree families of the province.

A few additional less common tree species omitted from the book were named as new from specimens collected in Esmeraldas by the 1943 survey, including: Heisteria cyathiformis Little, Brownea puberula Little, Miconia littlei Wurdack, Dermatocalyx panduratus Moldenke. In 1943, sterile specimens of these odd, then unnamed species were collected in Esmeraldas: Hyperonima chocoensis Cuatr., Huberodendron patinoti Cuatr., Vochysia macrophylla Stafleu. Also fruiting specimens of Persea rigens C. K. Allen, a species described from my Panama specimens collected earlier the same year. A few other species were unnamed when collected in 1943 but were described afterwards from Colombian specimens. Examples are Conostegia cuatrecasii Gleas. and Miconia centronioides Gleas. Also, Inga chocoensis Killip ex Elias, found in Esmeraldas in 1965, was named in 1967 from a Colombian specimen.

Thus, this accessible area of wet tropical (rain) forests bordering the Pacific Ocean in northwestern Ecuador yielded many tree species new to science. Most of these probably occur also in adjacent southwestern Colombia in Nariño, some northward to Chocó or even Panama. Additional novelties are to be expected in the adjacent lower slopes of the Andes, where my field work was limited.

Among the less common tree species omitted from the book were about 40 collected in Esmeraldas in 1943 and listed in my earlier report (A collection of tree specimens from western Ecuador. Caribbean Forester 9: 215-298. 1948). That forest survey of several provinces in western Ecuador obtained large collections of other species. The 1965-1966 collection contains a smaller number of less common species that were not mentioned in the book.

**CHRYSOPHYLLUM COLLINUM** Little, sp. nov. "Caimitillo." Fig. 24.

Arbor magna sempervirens ad 40 m. alta, trunco 45 cm diametro, anteridibus humilibus angustis, latice albo. Cortex griseus vel brunneus fere laevis vel subtiliter fissuratus, lenticellis multis parvis verrucosis; cortex interior roseo- vel rubrovittatus, insipidus vel leviter amarus, latice albo insipido. Ramuli crassi; gemmae nudae foliorum minorum plicatorum formatae. Ramuli, gemmae, folia juvenia atque nervi foliorum subtus puberuli cinnamomei. Folia alterna, petiolis 2-3 cm. longis, longitudinaliter sulcatis, flavido-viridibus. Laminae ellipticae, 10-25 cm. longae, 5-12 cm. latae, parum coriaceae, apice et basi acutae vel acuminatae, margine integrae, nervis lateralibus multis parallelis fere rectis et impressis, supra atrovirentes glabrae et parum nitidae, subtus pallido-virides subtiliter adpresso-puberulae nervis lateralibus prominentibus cinnamomeis.

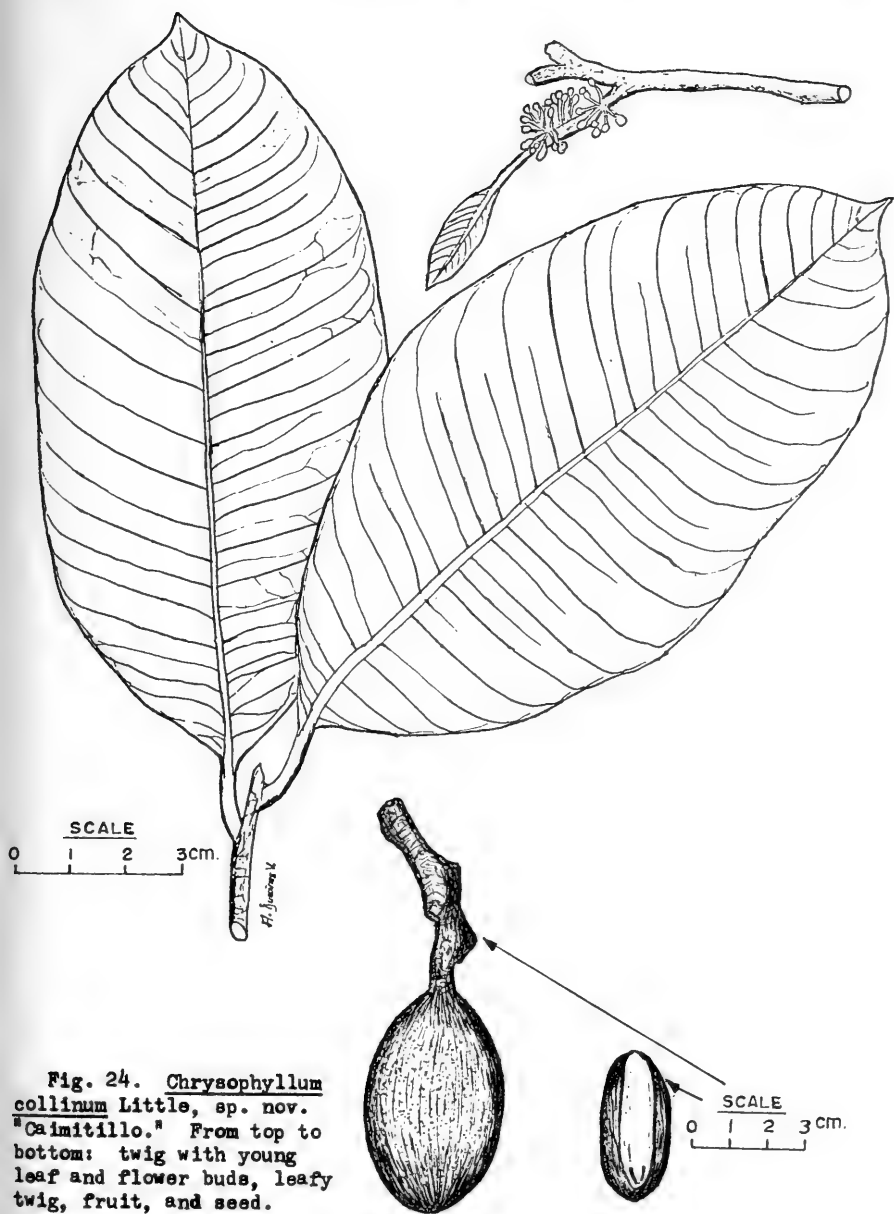


Fig. 24. *Chrysophyllum collinum* Little, sp. nov. "Caimitillo." From top to bottom: twig with young leaf and flower buds, leafy twig, fruit, and seed.

Flores pauci vel multi, ad nodos infra folia juvenia laterales pedicellis brevibus tenuibus puberulis 5-7 mm. longis. Alabastra rotundata, 2 mm. diametro, sepalis 5 imbricatis rotundatis puberulis fere 2 mm. longis; corolla tubularis glabra 5-lobata; stamina 5 ad tubum corollae alternatim lobulis inserta, antheris glabris; et pistilum ovario puberulo 5-loculare, ovulo 1 in quoque loculo, stylo brevi. Baccae ellipsoideae 6 cm. longae, 4 cm. diametro, pulpa aurantiacea tenui eduli saccharina. Semen 1 ellipsoideum 4.5 cm. longum, 2.5 cm. diametro, cicatrice longa lata.

Large evergreen tree to 30 m. high, with trunk 45 cm. in diameter, with low narrow buttresses. Bark gray or brown, smoothish or finely fissured, with many small warty lenticels; inner bark pink or reddish streaked, tasteless or slightly bitter, with white tasteless latex. Twigs stout; buds naked, formed from minute folded leaves. Twigs, buds, young leaves, and nerves of lower leaf surfaces appressed puberulent with cinnamon colored hairs. Leaves alternate, with petioles 2-3 cm. long, longitudinally grooved, yellow green. Blades elliptic, 10-25 cm. long, 5-12 cm. broad, slightly coriaceous, acute or acuminate at apex and base, with entire margin, with many parallel lateral nerves nearly straight and impressed, the upper surface dark green glabrous and slightly shiny, and the lower surface light green finely appressed puberulent, with prominent cinnamon brown lateral nerves.

Flowers few or many, lateral at nodes below young leaves with short slender puberulent pedicels 5-7 mm. long. Buds 2 mm. in diameter, with 5 overlapping rounded puberulent sepals nearly 2 mm. long, with tubular glabrous 5-lobed corolla, 5 stamens inserted on corolla tube opposite the lobes; and pistil with puberulent 5-celled ovary with 1 ovule in each locule and short style. Berry ellipsoidal, 6 cm. long, 4 cm. in diameter, orange, with thin edible sweetish pulp. Seed 1, ellipsoidal, 4.5 cm. long, 2.5 cm. in diameter, with long broad scar. Collected with flower buds and fruits in September.

ECUADOR, ESMERALDAS: Alto Tambo, alt. 650 m., lower montane forest, Sept. 23, 1965, E. L. Little, Jr., and R. G. Dixon 21124 (HOLOTYPE, US; isotype, NY); Sept. 22, 1965, E. L. Little, Jr., and R. G. Dixon 21116 (US, NY; wood sample, MADw).

Wood hard, with thin whitish sapwood and pink heartwood, with annual growth rings. Probable uses, construction, furniture, trim, and flooring.

A wood sample was taken from a tree from which herbarium specimens (21116) were obtained. Tests were made by the forest products laboratory at Universidad de Los Andes, Mérida, Venezuela. Physical characteristics of the wood were summarized in Spanish (page 474), as follows:

Specific gravity: 1.16 (green) and 0.97 (oven-dry). High modulus of elasticity. High resistance to compression parallel to the fibers, and low resistance perpendicular to the fibers. High modulus of rupture in compression parallel to the fibers. High hardness. Medium resistance to shearing. Very high toughness (tenacity). No difference in color between sapwood and heartwood. Natural color attractive. Straight grain. Crystals and resins present in wood.

The genus Chrysophyllum L. (family Sapotaceae) is tropical but largely American. The New World species, about 40, were monographed by Arthur Cronquist: Studies in the Sapotaceae--I. The North American species of Chrysophyllum. Torrey Bot. Club Bul. 72: 192-205. 1945; V. The South American species of Chrysophyllum. 73: 286-311. 1946.

Chrysophyllum collinum has mostly persistent cinnamon-colored pubescence and large orange ellipsoidal fruits. It was found in the foothills of the Andes at Alto Tambo and not in the coastal plain. A Spanish description and drawing of this new species were published as 194. Caimitillo, Chrysophyllum sp. by Little and Dixon (Arboles Comunes de la Provincia de Esmeraldas p. 472-474. 1969 [1970]). The drawing is repeated here (fig. 24).

The related species Chrysophyllum auratum Miq. (Cynodendron auratum (Miq.) Baehni) is scattered in the wet tropical forest and tropophytic forest of the coastal plain of western Esmeraldas. It was collected by the forest survey at Atacames and Borbón (E. L. Little, Jr., and R. G. Dixon 21005, 21034) and at Río Pambil (C. Játiva and C. Epling 1086). In the forest survey of 1943, it was collected at Santo Domingo de los Colorados, Province of Pichincha, and at Playa de Oro, Province of Esmeraldas (E. L. Little, Jr. 6144, 6408). A Spanish description and drawing were published as 195. Manzano. Chrysophyllum auratum Miq. (p. 470-471). That species has rufous pubescence that turns pale in age and smaller purplish ellipsoidal or rounded fruits, also mostly smaller leaves. A variation with corolla glabrous or nearly so has been named from the foothills near Bucay in western Ecuador as C. auratum var. glabriflorum Morachino (Phytologia 4: 38. 1952).

Matisia soegengii Cuatrecasas (Phytologia 20: 468, fig. 1. 1971) is represented by sterile specimens collected in 1943 and 1965. Under 151. Sapotillo, Matisia sp., this recently named distinctive species was described and illustrated by Little and Dixon (p. 362-363). This species was meant in the indirect reference to incomplete material of an unnamed species of Matisia (Phytologia 18: 202. 1969). Sterile specimens were collected first at Santo Domingo de los Colorados, Pichincha, by the forest survey in 1943 (E. L. Little, Jr. 6161, US) and again at Río Hoja Blanca with Río Hualpi, Esmeraldas, in 1965 (E. L. Little, Jr. 21077, US, NY). The very large rounded cordate

leaves 25-40 cm. long and broad, with stout petioles almost as long, serve for recognition. The first specimen had been filed under the related species M. stenopetala Standl. et Cuatr. of Loreto, Peru. Also, the drawing of the flower (p. 636) was made from a specimen of that species from Peru. This species was named from good flowering material collected by Wertit Soegeng (Sept. 6, 1961, s. n., US, holotype).

Clusia venusta Little (Phytologia 19: 262-267, figs. 20-22. 1970), "matapalo." A detailed description and drawings of this interesting species have been published recently by Bassett Maguire (Continuing studies in the Guttiferae. Phytologia 19: 501-507. illus. 1970).

Virola flexuosa A. C. Smith is the fourth species of this genus, common name "chalviande," to be recorded from Esmeraldas. The sterile specimen (E. L. Little, Jr., and R. G. Dixon 21147) was cited by Little and Dixon (p. 128-129) as Virola sp. and related to that species. The determination as that species has since been confirmed.

The collection contains two related species of Echweilera (Lecythidaceae), known as "guasca," "teteguasca," and "cacaco." These were described in Spanish and illustrated by Little and Dixon (p. 432-435). One was identified there as Eschweilera pittieri R. Knuth, a species of Panama. The second was cited as Eschweilera sp. nov. but after further study is referred doubtfully here to another species of Panama, also Costa Rica, E. calyculata Pittier (?). This species was found in the wet tropical forest along Río Verde (E. L. Little, Jr., and R. G. Dixon 21192, 21195, 21201). The earlier specimen of the 1943 forest survey from Quinindé (E. L. Little, Jr. 6238) had been identified for the collector as apparently a new species.

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STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXI.

ADDITIONS TO THE GENUS, OPHRYOSPORUS.

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The genus Ophryosporus was treated in a previous paper of this series (King & Robinson, 1972) with only minor alterations from pre-existing concepts. Our circumscription of the genus recognized 29 species ranging from Chile to Brazil and Colombia, and the one addition was Trychinolepis hoppii B.L. Robinson of southern Peru which differed from the other species by a squamose rather than setose pappus. Further revision shows even greater variation in the structure of the pappus with the need to transfer the entire subgenus Artemisioides A.P. Decandolle from Piqueria to Ophryosporus. All variations from setose and squamose pappus to pappus completely absent are represented in the genus.

The present revision alters the genus in scarcely anyway aside from the variation of the pappus. The most distinctive species among those added here is O. cumingii which has a vestigial squamose pappus and has rather strongly mamilllose cells on the corolla lobes. In other features the genus Ophryosporus is still amazingly uniform. The anther appendages are greatly reduced, divided and reflexed. The style branches all show mamillosity or even papillosity on the lower part but have enlarged smooth tips. The carpodia are distinct with many rows of small cells and the base of the achene has a rather distinct twist or asymmetry. Another characteristic worthy of more emphasis is the compact nature of the inflorescence whose lateral heads have been noted in a number of species apparently arising from within the involucre bracts of primary heads. The enlarged smooth tips of the style branches, the smaller number of flowers and phyllaries, the leaves lacking glandular punctations, the compact inflorescences, the distinct carpodia with small cells, the more narrow funnel-form corollas and smoother lobes on the corollas all distinguish Ophryosporus from the unrelated South American species that have been placed in Piqueria. Typical Piqueria in Mexico is even more distinct by the papillose to setiferous filaments of the anthers and the more

sparse minute punctations of the achene walls.

On the basis of the revised concept of the genus we transfer the following additional 9 species to the genus. In the present concept the genus consists of 38 species.

Ophryosporus anomalus R.M.King & H.Robinson, nom. nov.  
Piqueria cumingii B.L.Robinson, Proc. Amer. Acad.  
42: 11. 1906. Chile, Peru.

Ophryosporus densiflorus (Benth.) R.M.King & H.Robinson,  
comb. nov. Piqueria densiflora Benth. Bot. Sulph.  
110. 1845. Ecuador.

Ophryosporus floribundus (A.P.Decandolle) R.M.King &  
H.Robinson, comb. nov. Piqueria floribunda  
A.P.Decandolle, Prodr. 5: 105. 1836. Chile, Peru.

Ophryosporus galioides (A.P.Decandolle) R.M.King & H.  
Robinson, comb. nov. Piqueria galioides A.P.  
Decandolle, Prodr. 5: 105. 1836. Peru.

Ophryosporus hartwegii (B.L.Robinson) R.M.King & H.  
Robinson, comb. nov. Piqueria hartwegii B.L.Rob-  
inson, Proc. Amer. Acad. 42: 14. 1906. Peru.

Ophryosporus mathewsii (B.L.Robinson) R.M.King & H.  
Robinson, comb. nov. Piqueria mathewsii B.L.Rob-  
inson, Proc. Amer. Acad. 42: 12. 1906. Peru.

Ophryosporus peruvianus (Gmel.) R.M.King & H.Robinson,  
comb. nov. Flaveria peruviana Gmel., Syst. 2:  
1269. 1791. Ecuador, Peru.

Ophryosporus pinifolius (Phil.) R.M.King & H.Robinson,  
comb. nov. Stevia pinifolia Phil., Ann. Mus. Nac.  
Chil. sec. 2 (botanica), 37. 1891. Chile.

Ophryosporus pubescens (J.E.Smith) R.M.King & H.Robin-  
son, comb. nov. Piqueria pubescens J.E.Smith in  
Rees, Cycl. 27. no. 2. 1814. Peru.

## Reference

- King, R.M. & H. Robinson 1972. Studies in the Eupatorieae (Asteraceae). LXXIII. The genus Ophryosporus. Phytologia 23: 397-400.

## Acknowledgement

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# ADDITIONAL NOTES ON THE ERIOCAULACEAE. XL

Harold N. Moldenke

## ERIOCAULACEAE Lindl.

Additional bibliography: Hare, Proc. Linn. Soc. Lond. 157: 134. 1946; Gledhill, Check List Flow. Pl. Sierra Leone 31. 1962; Billore & Hemadri, Bull. Bot. Surv. India 11: 345. 1969; Cherian & Pataskar, Bull. Bot. Surv. India 11: 395. 1969; Rao & Verma, Bull. Bot. Surv. India 11: 410. 1969; Shah & Despande, Bull. Bot. Surv. India 11: 283. 1969; Shah & Suryanarayana, Bull. Bot. Surv. India 11: 298. 1969; N. P. Singh, Bull. Bot. Surv. India 11: 357. 1969; Stieber, Castanea 36: 277. 1971; Lewalle, Bull. Jard. Nat. Belg. 42 [Trav. Univ. Off. Bujumb. Fac. Sci. C. 20]: 43, 46, & [237]. 1972; Lind & Tallantire, Some Com. Flow. Pl. Uganda 198 & 243. 1972; Moldenke, Phytologia 24: 455--497, 507, 508, & 511. 1972.

## ERIOCAULON Gron.

Additional bibliography: Hare, Proc. Linn. Soc. Lond. 157: 134. 1946; Gledhill, Check List Flow. Pl. Sierra Leone 31. 1962; Billore & Hemadri, Bull. Bot. Surv. India 11: 345. 1969; Cherian & Pataskar, Bull. Bot. Surv. India 11: 395. 1969; Rao & Verma, Bull. Bot. Surv. India 11: 410. 1969; Shah & Despande, Bull. Bot. Surv. India 11: 283. 1969; Shah & Suryanarayana, Bull. Bot. Surv. India 11: 298. 1969; N. P. Singh, Bull. Bot. Surv. India 11: 357. 1969; Stieber, Castanea 36: 277. 1971; Lewalle, Bull. Jard. Nat. Belg. 42 [Trav. Univ. Off. Bujumb. Fac. Sci. C. 20]: 43, 46, & [237]. 1972; Moldenke, Phytologia 24: 456--497 & 508. 1972.

## ERIOCAULON ROBUSTO-DROWNIANUM Ruhl.

Additional bibliography: Moldenke, Phytologia 24: 497. 1972. Das & Mukerjee (1969) cite Law s.n. [Canara, Dharwar, & Bel-lary districts] as cotype collections of this species, deposited in the Calcutta herbarium, Stocks, Law, &c. s.n. [Malabar, Con-can], W. A. Talbot 3217, Gamble 15421, and S. Paul s.n. [Cherra-punji, Assam], all deposited in the Central National Herbarium at Calcutta. They describe the species as "a striking plant for its white acuminate floral bracts" and say that it "is well known from Peninsular India, Western Mysore, Coorg, Kanara, Malabar, and Wyn-aad". They also record it from Assam and comment that "its dis-tributional area now extends to Eastern India."

Saldanha refers to the species as a "common herb in marshy soil" and "in open water-logged soil" and found it in flower and fruit in February and October.

Additional citations: INDIA: Mysore: S. N. Ramaswamy 24 (Z); Saldanha 11571 (W), CS.10232 (W).

## ERIOCAULON ROBUSTUM Steud., Syn. Pl. Glum. 2: [Cyp.] 271. 1855.

Additional & emended bibliography: Fyson, Journ. Indian Bot. 1: 50 (1919) and 2: 310--312, pl. 29 & 30. 1921; Moldenke, Phytologia

20: 18. 1970; Blasco, Journ. Bombay Nat. Hist. Soc. 67: 525. 1970; Blasco, Inst. Franç. Pond. Trav. Sec. Scient. & Techn. 10: 94, 260, & 401. 1971; Moldenke, Fifth Summ. 1: 275 (1971) and 2: 495, 510, & 941. 1971; Moldenke, Phytologia 23: 422 & 424 (1972) and 24: 343 & 344. 1972.

Charoenphol and his associates encountered this species growing at 1100 meters altitude in Thailand, flowering and fruiting in November.

The Eriocaulon robustum var. caulescens of Fyson's pl. 30 (1921) is actually E. atratum var. major Thwaites.

Additional citations: THAILAND: Charoenphol, Larsen, & Warncke 4645 (Ac).

ERIOCAULON ROCKIANUM Hand.-Mazz., Symb. Sin. 7: 1246. 1936.

Additional & emended bibliography: Moldenke, Phytologia 2: 219--220, 376, & 379 (1947) and 19: 412. 1970; Moldenke, Fifth Summ. 1: 289 (1971) and 2: 510 & 941. 1971.

ERIOCAULON ROLLANDII Rousseau, Bull. Jard. Bot. Brux. 27: 372. 1957.

Additional bibliography: Moldenke, Phytologia 18: 447. 1969; Moldenke, Fifth Summ. 1: 14 (1971) and 2: 941. 1971.

ERIOCAULON ROSEUM Fyson, Journ. Indian Bot. 1: 50--53, fig. 13, hyponym (1919) and 2: 204. 1921.

Additional & emended bibliography: Fyson, Journ. Indian Bot. 1: 50--53, fig. 13. 1919; Moldenke, Phytologia 18: 447. 1969; Moldenke, Phytologia 18: 447. 1969; Moldenke, Fifth Summ. 1: 283 (1971) and 2: 941. 1971.

Additional illustrations: Fyson, Journ. Indian Bot. 1: 51, fig. 13. 1919.

ERIOCAULON ROSULATUM Körn., Linnaea 27: 600. 1856.

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 42, 53, 287, & 291. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402 (1946) and pr. 3, 2: 402. 1960; Moldenke, Phytologia 20: 19. 1970; Moldenke, Fifth Summ. 1: 150 (1971) and 2: 510, 590, & 941. 1971.

ERIOCAULON ROUXIANUM Steud., Syn. Pl. Glum. 2: [Cyp.] 270--271. 1855.

Additional bibliography: Moldenke, Phytologia 20: 19 (1970) and 21: 428. 1971; Moldenke, Fifth Summ. 1: 275 (1971) and 2: 511 & 941. 1971.

ERIOCAULON RUBESCENS Moldenke, Bol. Soc. Venez. Cienc. Nat. 23: 99--100. 1962.

Additional bibliography: Moldenke, Phytologia 18: 448. 1969; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970; Moldenke, Fifth Summ. 1: 123 (1971) and 2: 941. 1971.

*ERIOCAULON RUHLANDII* Schinz, Bull. Herb. Boiss., sér. 2, 6: 710.. 1906.

Additional bibliography: Moldenke, Phytologia 18: 448--449. 1969; Moldenke, Fifth Summ. 1: 254 & 256 (1971) and 2: 941. 1971.

*ERIOCAULON SACCATUM* Van Royen, Nov. Guin., new ser., 10: 42--43, fig. 4 Q. 1959.

Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 91. 1969; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970; Moldenke, Fifth Summ. 1: 336 (1971) and 2: 941. 1971.

*ERIOCAULON SACHALINENSE* Miyabe & Nakai, Bot. Mag. Tokyo 42: 479. 1928.

Additional bibliography: Moldenke, Phytologia 18: 449 (1969) and 20: 413 & 414. 1970; Moldenke, Fifth Summ. 1: 308 (1971) and 2: 941. 1971.

*ERIOCAULON SANTAPAU* Moldenke, Phytologia 3: 166--167. 1949.

Additional bibliography: Moldenke, Phytologia 18: 450. 1969; Moldenke, Fifth Summ. 1: 275 (1971) and 2: 941. 1971.

*ERIOCAULON SAKATEANUM* Tatesw. & Itô, Journ. Jap. Bot. 40: 156--157. 1965.

Additional bibliography: Moldenke, Phytologia 18: 450. 1969; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970; Moldenke, Fifth Summ. 1: 310 (1971) and 2: 941. 1971.

*ERIOCAULON SCARIOSUM* J. E. Sm. in Rees, Cycl. 13: Eriocaulon. 1809.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 149, 154--157, 159, 161, 162, 168--170, 172, 176, 177, & 180, fig. 32 J, 33 L, 35 K, & 36 A & K. 1969; Bolikh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl. 274. 1969; Burbidge & Gray, Fl. Austr. Cap. Terr. 92 & 431, fig. 92. 1970; Moldenke, Phytologia 20: 19. 1970; Hocking, Excerpt. Bot. A.19: 43. 1971; Moldenke, Fifth Summ. 1: 346, 349, & 403 (1971) and 2: 504, 513, & 941. 1971.

Additional illustrations: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 154, 156, 168, & 176, fig. 32 J, 33 L, 35 K, & 36 A & K. 1969; Burbidge & Gray, Fl. Austr. Cap. Terr. 93, fig. 92. 1970.

Burbidge & Gray (1970) tell us that this species is "Widespread in eastern Australia though rarely common."

*ERIOCAULON SCHIEDEANUM* Körn. in Mart., Fl. Bras. 3 (1): 492. 1863.

Additional bibliography: Moldenke, Phytologia 20: 14 & 19. 1970; Moldenke, Fifth Summ. 1: 69 (1971) and 2: 503, 506, & 941. 1971.

*ERIOCAULON SCHIMPERI* Körn. ex Engl., Abh. Preuss. Akad. Wiss.

1891: 154, nom. nud. (1892); Ruhl. in Engl., Bot. Jahrb. 27:

80. 1899.

Additional bibliography: Moldenke, *Phytologia* 2: 364, 375, 378, & 379 (1947) and 19: 412, 413, & 487. 1970; Cuf., *Bull. Jard. Bot. Belg.* 41 (3): Suppl. 1507. 1971; Moldenke, *Fifth Summ.* 1: 212, 230, 233, 234, 237, 246, & 249 (1971) and 2: 497, 506, 511, 516, & 941. 1971; Lewalle, *Bull. Jard. Nat. Belg.* 42 [Trav. Univ. Off. Bujumb. Fac. Sci. C. 20]: 46 & [237]. 1972.

The original publication of this binomial is given by Ruhland (1903) as "Engl., Hochgebirgsfl. Trop. Afr. 154", while others cite it as "Abh. Akad. Wiss. Berlin 1891, 154". Lewalle (1972) cites his no. 1420 from Burundi.

**ERIOCAULON SCHIMPERI** var. **GIGAS** Moldenke, *Phytologia* 2: 364. 1947.

Additional & emended bibliography: Moldenke, *Phytologia* 2: 364, 375, & 379 (1947) and 19: 413. 1970; Moldenke, *Fifth Summ.* 1: 241 (1971) and 2: 941. 1971.

**ERIOCAULON SCHIPPPII** Standl. ex Standl. & Record, *Field Mus. Publ. Bot.* 12: 90, hyponym (1936); Moldenke, *N. Am. Fl.* 19: 34. 1937.

Additional bibliography: Schipp, 1933-34 Price-list 57. 1934; Moldenke, *Phytologia* 20: 19. 1970; Lowden, *Taxon* 19: 836. 1970; Moldenke, *Fifth Summ.* 1: 81 & 243 (1971) and 2: 511 & 941. 1971.

**ERIOCAULON SCHLECHTERI** Ruhl. in Engl., *Bot. Jahrb.* 27: 78—79. 1899.

Additional bibliography: Moldenke, *Phytologia* 19: 413. 1970; Moldenke, *Fifth Summ.* 1: 251 (1971) and 2: 941. 1971.

**ERIOCAULON SCHOCHIANUM** Hand.-Mazz., *Anz. Akad. Wiss. Wien* 57: 238. 1920.

Additional bibliography: Moldenke, *Phytologia* 19: 98—99. 1969; Moldenke, *Fifth Summ.* 1: 289 (1971) and 2: 941. 1971.

**ERIOCAULON SCHOCHIANUM** var. **PARVICEPS** Hand.-Mazz., *Symb. Sin.* 7: 1246. 1936.

Additional bibliography: Moldenke, *Phytologia* 19: 99. 1969; Moldenke, *Fifth Summ.* 1: 289 (1971) and 2: 941. 1971.

**ERIOCAULON SCHULTZII** Benth. in Benth. & F. Muell., *Fl. Austral.* 7: 195—196. 1878.

Additional bibliography: Moldenke, *Phytologia* 19: 99. 1969; Moldenke, *Fifth Summ.* 1: 346 (1971) and 2: 941. 1971.

**ERIOCAULON SCHWEICKERDTI** Moldenke, *Phytologia* 3: 416—417. 1951.

Additional bibliography: Moldenke, *Phytologia* 19: 99. 1969; Moldenke, *Fifth Summ.* 1: 248 (1971) and 2: 941. 1971.

**ERIOCAULON SCLEROCEPHALUM** Ruhl. in Fedde, *Repert. Sp. Nov.* 22: 31. 1925.

Additional & emended bibliography: Moldenke, *Phytologia* 1: 323, 351, 352, 354, & 355 (1939) and 19: 413. 1970; Moldenke, *Fifth*

Summ. 1: 96 & 99 (1971) and 2: 511 & 941. 1971.

Additional citations: CUBA: Pinar del Río: Sastre 438 (N, P).

*ERIOCAULON SEDGWICKII* Fyson, Journ. Indian Bot. 1: 50, hyponym (1919) and 2: 260--261, pl. 16. 1921.

Additional bibliography: Moldenke, Phytologia 19: 100. 1969; Moldenke, Fifth Summ. 1: 275 (1971) and 2: 941. 1971.

*ERIOCAULON SEEMANNII* Moldenke, N. Am. Fl. 19: 28--29. 1937.

Additional & emended bibliography: Moldenke, Phytologia 1: 323, 350, 361, & 363 (1939) and 3: 80. 1949; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 184, 186, & 191. 1969; Moldenke, Phytologia 19: 413. 1970; Dwyer, Raymondiana 4: 27. 1971; Moldenke, Fifth Summ. 1: 90 (1971) and 2: 511 & 941. 1971.

Dwyer (1971) says "cfr. seemannii Moldenke" for Woytkowski 8133 from Amazonas, Peru, but such an identification seems hardly likely.

*ERIOCAULON SEKIMOTOI* Honda, Bot. Mag. Tokyo 45: 299. 1931.

Synonymy: Eriocaulon atrum Nakai x E. hondoense Satake ex Koyama in Ohwi, Fl. Jap., [Engl. ed.], 269. 1965.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Ohwi, Fl. Jap., [Jap. ed.], 263, 267, & 1296. 1953; Koyama in Ohwi, Fl. Jap., [Engl. ed.], 266 & 269. 1965; Moldenke, Phytologia 19: 101. 1969; Moldenke, Fifth Summ. 1: 310 (1971) and 2: 494 & 941. 1971.

Koyama (1965) records the vernacular name "inu-no-hige-modoki" for this species and says of it "Possibly this is a natural hybrid between E. atrum Nakai x E. hondoense Satake", found only locally in Shimotsuke Province on Honshu island, Japan.

*ERIOCAULON SEKIMOTOI* f. GLABRUM Satake in Nakai & Honda, Nov. Fl. Jap. 6: 77. 1940.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap., [Engl. ed.], 269. 1965; Moldenke, Phytologia 19: 101. 1969; Moldenke, Fifth Summ. 1: 310 (1971) and 2: 941. 1971.

Koyama (1965) records the vernacular variant "yashū-inu-no-hige", says that the plant differs from the typical form only in having the "receptacles almost glabrous; involucre shorter, nearly as long as the disc flowers", and that it "Occurs with the typical phase".

*ERIOCAULON SELLOWIANUM* Kunth, Enum. Pl. 3: 545. 1841.

Additional bibliography: Moldenke, Phytologia 20: 19 & 107. 1970; Moldenke, Fifth Summ. 1: 150, 185, 195, & 362 (1971) and 2: 495, 511, & 941. 1971.

Philcox and his associates found this plant growing on wet campos and describes the inflorescence as white. Irwin & Soderstrom also describe the flower-heads as white and found the plant frequent among sedges and grasses in boggy depressions in campos. It has been collected at altitudes of 800 to 1200 meters, flowering in August and October. Material has been misidentified and dis-

tributed in some herbaria as Paepalanthus sp.

Additional citations: BRAZIL: Goiás: Irwin & Soderstrom 7643 (Ac, N). Mato Grosso: Hatschbach 24546 (Rf), 25254 (Ac); Philcox, Ferreira, & Bertoldo 3639 (N). Paraná: Hatschbach 25558 (Rf), 25898 (Ft), 26306 (Rf); Hatschbach, Smith, & Klein 28255 (Ac). ARGENTINA: Corrientes: Krapovickas, Cristóbal, Maruffak, Mroginski, Pire, & Pueyo 21273 (Rf).

ERIOCAULON SELLOWIANUM var. LONGIFOLIUM Moldenke, Phytologia 3: 117. 1951.

Additional bibliography: Moldenke, Phytologia 19: 102--104. 1969; Moldenke, Fifth Summ. 1: 150 & 185 (1971) and 2: 511 & 941. 1971.

ERIOCAULON SENEGALENSE N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 251. 1901.

Additional bibliography: Moldenke, Phytologia 19: 104. 1969; Moldenke, Fifth Summ. 1: 214 (1971) and 2: 941. 1971.

ERIOCAULON SENILE Honda, Bot. Mag. Tokyo 42: 507. 1928.

Additional bibliography: Moldenke, Phytologia 3: 114. 1949; Ohwi, Fl. Jap., [Jap. ed.], 262, 264, & 1296. 1953; Koyama in Ohwi, Fl. Jap., [Engl. ed.], 266 & 267. 1965; Moldenke, Phytologia 19: 104. 1969; Satake, Journ. Jap. Bot. 46: 372. 1971; Moldenke, Fifth Summ. 1: 310 & 312 (1971) and 2: 941. 1971.

Koyama (1965) records the vernacular variant "gomashio-hoshikusa" for this plant and avers that the species is "relatively rare" in wet lowlands on Honshu, Kyushu, and Shikoku islands, Japan.

ERIOCAULON SENILE f. PILOSUM Koyama ex Moldenke, Résumé Suppl. 12: 8 & 10, nom. nud. 1965.

Additional bibliography: Moldenke, Phytologia 19: 104. 1969; Moldenke, Fifth Summ. 1: 310 (1971) and 2: 511 & 941. 1971.

ERIOCAULON SEPTANGULARE With.

This species, as commonly interpreted, is now divided into two parts: the North American is now known as E. pellucidum Michx. and the European is now known as E. aquaticum (J. Hill) Druce.

ERIOCAULON SESSILE Meikle, Kew Bull. 1954: 275. 1954.

Additional bibliography: Moldenke, Phytologia 19: 233. 1970; Moldenke, Fifth Summ. 1: 216 (1971) and 2: 941. 1971.

ERIOCAULON SETACEUM L., Sp. Pl., ed. 1, pr. 1, 1: 87. 1753.

Additional synonymy: Eriocavlon setaceum Raesch., Nom. Bot. 30. 1797.

Additional bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, 2: 206. 1791; Pers., Sp. Pl. 1: 284. 1817; Fyson, Journ. Indian Bot. 1: 50. 1919; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3:

161, 166, 167, 186, 189, & 191. 1969; S. P. & R. N. Banerjee, Bull. Bot. Soc. Bengal 23: 170. 1969; Moldenke, Phytologia 20: 7 & 20 (1970) and 21: 276. 1971; Satake, Journ. Jap. Bot. 46: 372. 1971; Moldenke, Fifth Summ. 1: 268, 275, 281, 283, 285, 296, 301, & 346 (1971) and 2: 496, 497, 507, 512, 518, 525, 594, 616, 632, 645, & 942. 1971; Lewalle, Bull. Jard. Nat. Belg. 42 [Trav. Univ. Off. Bujumb. Fac. Sci. C. 20]: [237]. 1972; Moldenke, Phytologia 23: 422. 1972.

Meikle regards E. melanocephalum Kunth as conspecific with and therefore a synonym of E. setaceum. The Banerjees (1969) record E. setaceum from Bihar, India. Lewalle (1972) records it from Burundi and cites his no. 5407, but I assume that his plant is the African representative, E. bifistulosum Van Heurck & Muell.-Arg.

The Hunt & Ramos 5909 and Philcox & Freeman 4639, distributed as E. setaceum, are actually E. melanocephalum Kunth.

ERIOCAULON SETICUSPE Ohwi, Bull. Nat. Sci. Mus. Tokyo, new ser., 1 (1) [34]: 3. 1954.

Emended synonymy: Eriocaulon echinulatum var. seticuspe (Ohwi) Ohwi, Journ. Jap. Bot. 33: 211. 1958.

Additional bibliography: Ohwi, Journ. Jap. Bot. 33: 211. 1958; Hisauchi, Excerpt. Bot. A.2: 194. 1960; Koyama in Ohwi, Fl. Jap., [Engl. ed.], 265 & 266. 1965; Moldenke, Phytologia 19: 237. 1970; Moldenke, Fifth Summ. 1: 310 (1971) and 2: 942. 1971.

Koyama (1965) records the vernacular name "hyūga-hoshi-kusa" for this plant and asserts that the species is "rare" on Kyushu island, Japan.

The Nomura 13011, cited below, is a topotype, and the collector states that he found the plants scattered in very shallow water on the margin of a large pond, at 100 meters altitude, flowering and fruiting in October.

Additional citations: JAPAN: Kyushu: Nomura 13011 (N).

ERIOCAULON SEXANGULARE L., Sp. Pl., ed. 1, pr. 1, 1: 87. 1753.

Additional synonymy: Eriocavlon hexangulare Raeusch., Nom. Bot. 30. 1797. Eriocavlon quadrangulare Raeusch., Nom. Bot. 30. 1797. Eriocaulon wallichianum f. submersa Arber ex Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 189, hyponym. 1969.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, 2: 206. 1791; Billb. in Thunb., Pl. Bras. Dec. 1: 7. 1817; Pers., Sp. Pl. 1: 284. 1817; Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 24, 29, 41, & 63. 1835; Thwaites & Hook. f., Enum. Pl. Zeyl., pr. 1, 341. 1864; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Fyson, Journ. Indian Bot. 1: 50 & 53. 1919; Ridl., Fl. Mal. Penins. 5: 133. 1925; Hooper, Gard. Bull. Straits Settl. 6: 59. 1929; Burkill, Dict. Econ. Prod. Malay Penins. 1: 938. 1935; Hare, Journ. Linn. Soc. Lond. Bot. 53: 443. 1950; Sastri, Wealth India 3: 188. 1952; Darlington & Wylie, Chrom. Atl., pr. 1, 340 (1956) and pr. 2, 340. 1961;

Hocking, Excerpt. Bot. A.6: 455. 1963; Majumdar, Bull. Bot. Soc. Bengal 19: 15. 1965; Burkill, Dict. Econ. Prod. Malay Penins., ed. 2, 1: 953. 1966; Santapau, Excerpt. Bot. A.11: 176. 1967; Hansen, Excerpt. Bot. A.12: 520. 1967; Bolkh., Grif, Matvej., & Zakhar, Chrom. Numb. Flow. Pl. 274. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 159, 161, 162, 170, 171, & 190. 1969; Jeanplong, Phytion 14: 94. 1970; Moldenke, Phytologia 20: 8, 14, 15, 20, 23, 30, & 346. 1970; Amaratunga, Phytologia 20: 463. 1970; Moldenke, Fifth Summ. 1: 261, 264, 268, 275, 281, 283, 285, 289, 292, 293, 296, 301, 305, 309, 312, 313, 316, 320, 324, & 362 (1971) and 2: 492, 496, 497, 502, 505, 507—509, 512, 513, 515—518, 525, 533, 792, & 942. 1971; Moldenke, Phytologia 23: 424 & 431 (1972) and 24: 339 & 350. 1972.

The Martius reference cited above (1835) is often cited as "1833", but apparently was not actually issued until 1835.

Recent collectors have found this plant growing in wet soil by small stream. Fyson (1919) implies that his fig. 7 represents E. sexangulare, but its legend plainly states that it is meant to illustrate E. thomasi Fyson (now known as E. vanheurckii Muell.-Arg.)

Burkill (1966) records the vernacular names "rumpet butang" [button grass], "rumpet butang patak", "rumpet kumpai benang" [wick-thread grass], and "rumpet suasa" [gold and copper alloy grass] in Malaya. He says that it is "A herb found widely in the warmer parts of Asia and in Malaysia. It occurs in the rice-fields and forms part of the weed-growth which is ploughed in as green manure. The Chinese use it as a drug...and it may be seen in a fresh state in Chinese herbalists' shops in Malaya." Jeanplong (1970) records it from North Vietnam. Sastri (1952) says that "E. sexangulare Linn. is a stout herb occurring in the western parts of Deccan Peninsula. It has a short stem, erect, caespitose, linear leaves and many scapes (up to 18 in. long) bearing globose or ovoid, hoary flower-heads. This species forms part of the weed growth in rice fields of Malaya and is ploughed in as green manure. It is used as a drug in China (Burkill, 1, 938)."

Majumdar (1965) reduces E. sieboldianum Sieb. & Zucc. to synonymy under E. sexangulare L., but this is manifestly erroneous. Siebold & Zuccarini's name belongs in the synonymy of E. cinereum R. Br., a species totally unlike E. sexangulare!

Additional citations: INDIA: Kerala: Manila 11 (Ac). Mysore: Cook & Gut 204 (Rf), 208 (Ac). THAILAND: Charoenphol, Larsen, & Warncke 4446 (Ac).

ERIOCAULON SEXANGULARE f. VIVIPARUM Moldenke, Résumé Suppl. 5: 6, nom. nud. (September 8, 1962), Phytologia 8: 388. December 10, 1962.

Additional bibliography: Moldenke, Phytologia 19: 246 & 248. 1970; Moldenke, Fifth Summ. 1: 305 (1971) and 2: 942. 1971.

ERIOCAULON SIAMENSE Moldenke, Phytologia 5: 83—84. 1954.

Additional bibliography: Moldenke, Phytologia 19: 248. 1970;

Moldenke, Fifth Summ. 1: 296 (1971) and 2: 942. 1971.

Charoenphol and his associates found this species growing at 1100 meters altitude, flowering and fruiting in November.

Additional citations: THAILAND: Charoenphol, Larsen, & Warncke 4691 (Ac), 4800 (Ac).

ERIOCAULON SIGMOIDEUM C. Wright ex Sauv., Anal. Acad. Ci. Habana 8: 48. 1871.

Additional & emended bibliography: Moldenke, Phytologia 1: 327, 351, & 363 (1939) and 19: 415. 1970; Moldenke, Fifth Summ. 1: 96 & 99 (1971) and 2: 942. 1971.

ERIOCAULON SIKOKIANUM Maxim., Diagn. Pl. Nov. Asiat. 8: 16—17. 1893.

Additional synonymy: Eriocaulon sikokianum var. sikokianum Koyama in Ohwi, Fl. Jap., [Engl. ed.], 268. 1965.

Additional bibliography: Moldenke, Phytologia 2: 376 (1947), 2: 493 (1948), and 3: 143 & 144. 1949; Ohwi, Fl. Jap., [Jap. ed.], 262, 266, & 1296. 1953; Koyama in Ohwi, Fl. Jap., [Engl. ed.], 266 & 268—269. 1965; Moldenke, Phytologia 19: 415—416 & 477. 1970; Moldenke, Biol. Abstr. 51: 9023. 1970; Moldenke, Fifth Summ. 1: 308 & 310 (1971) and 2: 512, 513, & 942. 1971; Moldenke, Phytologia 21: 275 & 277 (1971) and 24: 491. 1972.

Koyama (1965) records the vernacular variant "shiro-inu-no-hige" for this plant and says that the typical form of the species can be distinguished from the following variety because of the "Receptacle pilose; floral bracts and calyces rather densely white-puberulent on the upper margin; ovary 3-locular; stigmas 3".

ERIOCAULON SIKOKIANUM var. MATSUMURAE (Nakai) Satake ex Koyama in Ohwi, Fl. Jap., [Engl. ed.], 269. 1965.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Ohwi, Fl. Jap., [Jap. ed.], 262, 264—265, & 1296. 1953; Koyama in Ohwi, Fl. Jap., [Engl. ed.], 269. 1965; Moldenke, Phytologia 19: 416. 1970; Moldenke, Biol. Abstr. 51: 9023. 1970; Moldenke, Fifth Summ. 1: 310 (1971) and 2: 505 & 942. 1971.

Koyama (1965) records the vernacular names "matsumura-ino-no-hige" and "ō-inu-no-hige" for this plant, says that it is known only from Bitchu province on Honshu island, Japan, and that it differs from the typical form of the species in having the "Receptacle glabrous; some pistillate flowers with the ovary 2-locular and with 2 stigmas".

ERIOCAULON SILICICOLA Ridl., Journ. Fed. Malay States Mus. 6: 191—192 [as "silicicolum"]. 1915.

Additional bibliography: Moldenke, Phytologia 19: 416—417. 1970; Moldenke, Fifth Summ. 1: 305 (1971) and 2: 513 & 942. 1971.

ERIOCAULON SILVEIRAE Moldenke, Known Geogr. Distrib. Erioc. 62. 1946.

Additional bibliography: Moldenke, Phytologia 2: 374 (1947) and 19: 417. 1970; Moldenke, Fifth Summ. 1: 150 (1971) and 2: 504 &

942. 1971.

ERIOCAULON SINII Ruhl., Notizbl. Bot. Gart. Berlin 10: 1041—1042. 1930.

Additional bibliography: Moldenke, *Phytologia* 19: 417—418. 1970; Moldenke, *Fifth Summ.* 1: 289 & 292 (1971) and 2: 942. 1971.

ERIOCAULON SMITINANDI Moldenke, *Phytologia* 7: 87. 1959.

Additional bibliography: Moldenke, *Phytologia* 19: 418. 1970; Moldenke, *Fifth Summ.* 1: 296 (1971) and 2: 513 & 942. 1971.

ERIOCAULON SOLLYANUM Royle, *Illustr.* 409, pl. 97, fig. 1 a, b, d—f, & i. 1840.

Additional bibliography: Fyson, *Journ. Indian Bot.* 1: 50—53, fig. 3. 1919; Moldenke, *Phytologia* 20: 18, 21, & 29. 1970; Moldenke, *Biol. Abstr.* 51: 9629. 1970; Moldenke, *Excerpt. Bot. A.* 18: 445. 1971; Moldenke, *Fifth Summ.* 1: 239, 261, 268, 275, 281, 289, 296, 301, 310, & 324 (1971) and 2: 502, 509, 510, 513—515, 767, 792, & 942. 1971; Moldenke, *Phytologia* 24: 474. 1972.

Additional illustrations: Fyson, *Journ. Indian Bot.* 1: 51, fig. 3. 1919.

Datta & Majumdar (1966) describe this species as "Perennial herbs of wet places and rice-fields. Leaves grey-green, opaque. Head globose, dark grey. Female flowers sessile.... Distributed in the tropics."

ERIOCAULON SONDERIANUM Körn., *Linnaea* 27: 669—671. 1856.

Additional bibliography: Van der Schijff, *Check List Vasc. Pl. Kruger Natl. Park* 36. 1969; Moldenke, *Phytologia* 20: 21. 1970; Venter, *Journ. S. Afr. Bot.* 37 (2): 105. 1971; Moldenke, *Fifth Summ.* 1: 249, 254, & 256 (1971) and 2: 513 & 942. 1971; Moldenke, *Phytologia* 23: 421. 1972.

Van der Schijff (1969) states that this species grows in moist places and in shallow water and cites Van der Schijff 2131. Venter (1971) records the species from Zululand.

ERIOCAULON SOUCHERETI Moldenke, *Phytologia* 4: 290—291. 1953.

Additional bibliography: Moldenke, *Phytologia* 19: 423—424 & 478. 1970; Moldenke, *Fifth Summ.* 1: 296 & 301 (1971) and 2: 942. 1971.

ERIOCAULON SPANGANIOIDES Bong., *Mém. Acad. Imp. Sci. St. Pétersb.*, sér. 6, 1: 637. 1831.

Additional bibliography: Moldenke, *Phytologia* 20: 21. 1970; Moldenke, *Fifth Summ.* 1: 150 (1971) and 2: 513 & 942. 1971.

ERIOCAULON SPECTABILE F. Muell., *Fragm.* 1: 95. 1859.

Additional bibliography: Moldenke, *Phytologia* 2: 376 (1947) and 19: 424. 1970; Moldenke, *Fifth Summ.* 1: 346 (1971) and 2: 942. 1971.

ERIOCAULON SPHAGNICOLA Ohwi, Bot. Mag. Tokyo 45: 196. 1931.

Additional bibliography: Moldenke, Phytologia 3: 143 (1949) and 19: 440. 1970; Moldenke, Biol. Abstr. 51: 9023. 1970; Moldenke, Fifth Summ. 1: 308 (1971) and 2: 774 & 942. 1971.

ERIOCAULON SPONGIOSIFOLIUM Alv. Silv., Arch. Mus. Nac. Rio Jan. 23: 161. 1921.

Additional bibliography: Moldenke, Phytologia 2: 494 (1948) and 19: 440. 1970; Moldenke, Fifth Summ. 1: 150 (1971) and 2: 514 & 942. 1971.

ERIOCAULON SPRUCEANUM Körn. in Mart., Fl. Bras. 3 (1): 488—489. 1863.

Additional bibliography: J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 490. 1936; Moldenke, Phytologia 20: 21. 1970; Hocking, Excerpt Bot. A.18: 444. 1971; Moldenke, Fifth Summ. 1: 116 & 150 (1971) and 2: 942. 1971; Moldenke, Phytologia 23: 417 & 418. 1972.

Additional citations: COLOMBIA: Vaupés: García-Barriga & Jaramillo Mejía 17128, in part (W--2569433a).

ERIOCAULON SPRUCEANUM f. AMPHIBIUM Herzog in Fedde, Repert. Spec. Nov. 29: 203—204 [as "amphibia"]. 1931.

Additional bibliography: Moldenke, Phytologia 19: 441 & 442. 1970; Moldenke, Fifth Summ. 1: 150 (1971) and 2: 514 & 942. 1971.

ERIOCAULON SPRUCEANUM f. FLUITANS Herzog in Fedde, Repert. Spec. Nov. 29: 203—204. 1931.

Additional bibliography: Moldenke, Phytologia 19: 441—442. 1970; Moldenke, Fifth Summ. 1: 150 (1971) and 2: 942. 1971.

ERIOCAULON SPRUCEANUM f. VIVIPARUM Moldenke, Phytologia 18: 342. 1969.

Additional bibliography: Moldenke, Phytologia 20: 21. 1970; Hocking, Excerpt. Bot. A.18: 444. 1971; Moldenke, Fifth Summ. 1: 116 (1971) and 2: 942. 1971; Moldenke, Phytologia 23: 417 & 418. 1972.

Santos & Souza found this plant growing in water at the edge of a river and record for it the vernacular name "capim cebola".

Additional citations: COLOMBIA: Vaupés: García-Barriga & Jaramillo Mejía 17096 (W--2569599a—isotype). BRAZIL: Mato Grosso: Santos & Souza R. 1758 (N).

ERIOCAULON STEINBACHII (Moldenke) Moldenke, Phytologia 2: 364. 1947.

Additional & emended bibliography: Moldenke, Phytologia 2: 231—232, 364—365, 374, 379, & 380. 1947; E. J. Salisb., Ind. Kew. Suppl. 11: 88 & 176. 1953; Moldenke, Phytologia 19: 442. 1970; Moldenke, Fifth Summ. 1: 182 (1971) and 2: 591 & 942. 1971.

ERIOCAULON STELLULATUM Körn., Linnaea 27: 620—621. 1856.

Additional & emended bibliography: Fyson, Journ. Indian Bot. 1:

50. 1919; Billore & Hemadri, Bull. Bot. Surv. India 11: 345. 1969; Moldenke, Phytologia 20: 21. 1970; Moldenke, Fifth Summ. 1: 268, 275, & 296 (1971) and 2: 514 & 942. 1971.

Billore & Hemadri (1969) found this plant growing on hillslopes and plateaus at Kedarnath, India, citing their nos. 115481 & 115532.

ERIOCAULON STELLULATUM var. LAOSENSE Moldenke, Phytologia 7: 119. 1960.

Additional bibliography: Moldenke, Phytologia 19: 443. 1970; Moldenke, Fifth Summ. 1: 301 (1971) and 2: 942. 1971.

ERIOCAULON STENOPHYLLUM R. E. Fr., Wiss. Ergebn. Schwed. Rhod.-Kong.-Exped. 1911-12 Bot. 1: 218, pl. 16. 1916.

Additional bibliography: Moldenke, Phytologia 19: 444. 1970; Moldenke, Fifth Summ. 1: 246 (1971) and 2: 942. 1971.

ERIOCAULON STEYERMARKII Moldenke, Fieldiana Bot. 28: 117--118. 1951.

Additional & emended bibliography: Moldenke, Phytologia 2: 379 (1947) and 2: 491 & 492. 1948; J. A. Steyerl., Act. Bot. Venez. 1: 195. 1966; Moldenke, Phytologia 19: 444. 1970; Oberwinkler, Pterid. & Sperm. Venez. 7 & 52. 1970; Moldenke, Fifth Summ. 1: 123, 129, & 132 (1971) and 2: 942. 1971.

This species has been found growing at 500--2600 meters altitude. Irwin and his associates describe it as "submerged in running water, only the inflorescences emergent, the heads light-gray" and found it growing on a campo in an area of cerrado on outcrops with adjacent wet campo (brejo), flowering in March.

Additional citations: VENEZUELA: Bolívar: Hertel & Oberwinkler 15199 (Mu). BRAZIL: Goiás: Irwin, Harley, & Smith 33115 (Ld, Z).

ERIOCAULON STILLULATUM Hook. ex R. Schomb., Fl. S. Austr. 62, nom. nud. 1875.

Bibliography: R. Schomb., Fl. S. Austr. 62. 1875; Moldenke, Phytologia 23: 425. 1972.

Nothing is known to me about this supposed species and I cannot find that it has ever been published validly or described. It is not listed in the Index Kewensis nor its supplements to date. It may represent merely a misapplication of the name, E. stellulatum Körn., but this does not seem very likely to have been a mistake likely to have been made by Hooker, since E. stellulatum is known only from Pakistan, India, and Thailand.

ERIOCAULON STOLONIFERUM Welw. ex Rendle, Cat. Afr. Pl. Welw. 2 (1): 101--102. 1899.

Additional bibliography: Moldenke, Phytologia 19: 444--446 (1970) and 20: 25 & 26. 1970; Moldenke, Fifth Summ. 1: 243 (1971) and 2: 942. 1971.

ERIOCAULON STRAMINEUM Körn. in Mart., Fl. Bras. 3 (1): 478. 1863.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 478 & 507. 1863; Moldenke, Phytologia 19: 446—447. 1970; Moldenke, Fifth Summ. 1: 150 & 180 (1971) and 2: 493 & 942. 1971.

Irwin and his associates describe the inflorescences of this species as attaining a height of 5 cm., with whitish heads, and found the plant growing in gallery forests and in wet places on wet campos, at 500—550 meters altitude, flowering and fruiting in May and June.

Additional citations: BRAZIL: Mato Grosso: Irwin, Grear, Souza, & Reis dos Santos 15956 (N, Rf); Irwin, Souza, Grear, & Reis dos Santos 17428 (N, Z).

ERIOCAULON STRIATUM Lam., Encycl. Méth. Bot. 3: 275, pl. 50, fig. 1. 1789.

Additional bibliography: Moldenke, Phytologia 20: 18, 20, & 21. 1970; Moldenke, Fifth Summ. 1: 201, 264, & 265 (1971) and 2: 494, 514, & 942. 1971.

The "Linnaea 27: 272. 1856" reference given previously in the bibliography of this species appears to be an error. I can find no mention of this plant on that page of the work in question, nor on the "p. 60" sometimes cited.

The species was collected at 1200 meters altitude by Bogner, flowering and fruiting in November.

Additional citations: MADAGASCAR: Bogner 350 (Mu).

ERIOCAULON STRICTUM Milne-Redhead in Hook., Icon. Pl. 34: pl. 3388. 1939.

Additional bibliography: Moldenke, Phytologia 19: 449—450. 1970; Moldenke, Fifth Summ. 1: 210, 237, 246, & 248 (1971) and 2: 942. 1971.

ERIOCAULON STUHLMANNI N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 255. 1901.

Additional bibliography: Moldenke, Phytologia 19: 450—451. 1970; Moldenke, Fifth Summ. 1: 214, 216, & 237 (1971) and 2: 514 & 942. 1971.

ERIOCAULON SUBGLAUCUM Ruhl. in Engl., Pflanzenreich 13 (4-30): 68. 1903.

Additional bibliography: Moldenke, Phytologia 2: 377 & 379 (1947) and 19: 451. 1970; Moldenke, Fifth Summ. 1: 281 (1971) and 2: 494, 501, 517, & 942. 1971.

Fyson (1922) seems to regard E. subglaucum as synonymous with E. atratum var. major Thwaites.

ERIOCAULON SUBMERSUM Welw. ex Rendle, Cat. Afr. Pl. Welw. 2 (1): 100—101. 1899.

Additional bibliography: Moldenke, Phytologia 19: 451—452. 1970; Moldenke, Fifth Summ. 1: 243 (1971) and 2: 942. 1971.

ERIOCAULON SUBULATUM N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8:

255. 1901.

Additional bibliography: Moldenke, *Phytologia* 19: 452—453. 1970; Moldenke, *Fifth Summ.* 1: 246, 248, 251, & 261 (1971) and 2: 942. 1971.

ERIOCAULON SUISHAENSE Hayata, *Icon. Pl. Formos.* 10: 55—56, fig. 31. 1921.

Additional synonymy: Eriocaulon nigrum var. suishaense Hals. & Koyuma ex Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 191. 1969.

Additional bibliography: Moldenke, *Phytologia* 3: 143. 1949; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 191. 1969; Moldenke, *Phytologia* 19: 453. 1970; Moldenke, *Fifth Summ.* 1: 312 & 313 (1971) and 2: 507, 514, & 942. 1971.

ERIOCAULON SUMATRANUM Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 88. 1903.

Additional bibliography: Moldenke, *Phytologia* 19: 453—454. 1970; Moldenke, *Fifth Summ.* 1: 324 (1971) and 2: 942. 1971.

ERIOCAULON TAKAE Koidz. in Matsumura, *Icon. Pl. Koisikav.* 1: 157, pl. 79. 1913.

Additional bibliography: Ohwi, *Fl. Jap.*, [Jap. ed.], 262, 265, & 1296. 1953; Koyama in Ohwi, *Fl. Jap.*, [Engl. ed.], 266 & 267. 1965; Moldenke, *Phytologia* 19: 454. 1970; Moldenke, *Fifth Summ.* 1: 310 (1971) and 2: 942. 1971.

Koyama (1965) records the vernacular variant "azuma-hoshi-kusa" for this plant and avers that the species occurs only in Iwashiro province on Honshu island, Japan.

ERIOCAULON TANAKAE Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 84. 1903.

Additional bibliography: Moldenke, *Phytologia* 19: 454. 1970; Moldenke, *Fifth Summ.* 1: 310 (1971) and 2: 942. 1971.

ERIOCAULON TAQUETII H. Lecomte, *Not. Syst.* 1: 192. 1910.

Additional bibliography: Moldenke, *Phytologia* 19: 454. 1970; Moldenke, *Fifth Summ.* 1: 308 (1971) and 2: 942. 1971.

ERIOCAULON TENUIFOLIUM Klotzsch in H. R. Schomb., *Faun. & Fl. Brit. Guian.* 1116, hyponym (1848); Korn. in Mart., *Fl. Bras.* 3 (1): 496. 1863.

Additional synonymy: Eriocaulon tenuifolium Eden, McGill Univ. Savan. Res. Ser. 1: 144, sphalm. 1964.

Additional bibliography: N. E. Br., *Trans. Linn. Soc. Lond. Bot.*, ser. 2, 6: 69. 1901; Eden, McGill Univ. Savan. Res. Ser. 1: 144. 1964; Moldenke, *Phytologia* 20: 21. 1970; Oberwinkler, *Pterid. & Sperm. Venez.* 7 & 52. 1970; Moldenke, *Fifth Summ.* 1: 123, 129, & 150 (1971) and 2: 514 & 942. 1971.

This species has been found growing at 120—500 meters altitude, flowering and fruiting in January, March, and October.

Additional citations: VENEZUELA: Bolívar: Hertel & Oberwinkler 15214 (Mu).

ERIOCAULON TENUISSIMUM Nakai, Bot. Mag. Tokyo 31: 97. 1917.

Additional bibliography: Moldenke, Phytologia 3: 143 (1949) and 19: 456. 1970; Moldenke, Fifth Summ. 1: 308 (1971) and 2: 506 & 942. 1971; Moldenke, Phytologia 24: 464. 1972.

ERIOCAULON TEPCANUM Moldenke, N. Am. Fl. 19: 36. 1937.

Synonymy: Eriocaulon tropicanum Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 186, sphalm. 1969.

Additional & emended bibliography: Moldenke, Phytologia 1: 327, 350, & 360. 1939; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 186 & 191. 1969; Moldenke, Phytologia 19: 456—457. 1970; Moldenke, Fifth Summ. 1: 69 (1971) and 2: 515 & 942. 1971.

ERIOCAULON TEUSCZII Engl. & Ruhl. ex Ruhl. in Engl., Bot. Jahrb. 27: 77—78. 1899.

Additional & emended bibliography: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 128, 129, 135, 141, 144, 145, 151—155, 157, 167, & 182, fig. 1—3, & pl. 7, fig. 10—12. 1955; Moldenke, Phytologia 3: 143. 1949; Moldenke, Phytologia 19: 457—459 & 470. 1970; C. C. Townsend, Excerpt. Bot. A. 15: 418. 1970; Moldenke, Fifth Summ. 1: 222, 237, 243, 246, 248, 251, & 253 (1971) and 2: 503, 504, 513, & 943. 1971.

ERIOCAULON TEXENSE Körn., Linnaea 27: 594. 1856.

Additional bibliography: Moldenke, Phytologia 20: 22, 41, & 42. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 353, 354, & 1824. 1970; Cusick, Castanea 35: 323. 1970; N. F. Good, Biol. Abstr. 52: 8223. 1971; Anon., Biol. Abstr. 52 (15): B.A.S.I.C. S.86. 1971; Moldenke, Fifth Summ. 1: 48 & 55 (1971) and 2: 943. 1971; Thieviet, La. Soc. Hort. Res. 13: 13. 1972; Moldenke, Phytologia 24: 473. 1972.

Cusick (1970) records this species "from two Louisiana Parishes, Washington County, Alabama, and George County, Mississippi (Kral, 1966). The author's collection in Jackson County [Mississippi] is a logical addition to this known range. It was collected on March 18, 1968, in a wet sphagnum area beside St. Rt. 63, 1 mile north-east of Orange Grove. Drosera capillaris Poir. and Sarracenia alata Wood occur at the same station. Perhaps the early blooming period accounts for the scarcity of records. Supposedly the plants have disappeared by summer. The soft heads and dark involucral bracts, together with the blooming date, readily distinguish this taxon from the commoner E. decangulare L." I suspect that the plant here referred to is E. lineare Small, as the other Mississippi (George Co.) record seems to be.

Thieret (1972) calls E. texense the "Texas pipewort". The Tharp 4434c, distributed as E. texense, is actually E. decangulare var. minor Moldenke

ERIOCAULON THAILANDICUM Moldenke, *Phytologia* 7: 88. 1959.

Additional bibliography: Moldenke, *Phytologia* 19: 461. 1970; Moldenke, *Fifth Summ.* 1: 296 (1971) and 2: 943. 1971.

ERIOCAULON THOUARSII H. Lecomte, *Bull. Soc. Bot. France* 55: 571—573. 1908.

Additional bibliography: Moldenke, *Phytologia* 19: 461—462. 1970; Moldenke, *Fifth Summ.* 1: 261 (1971) and 2: 943. 1971.

ERIOCAULON THUNBERGII Wikstr. ex Körn., *Linnaea* 27: 677—679. 1856.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: [146]. 1969; Moldenke, *Phytologia* 20: 22. 1970; Moldenke, *Fifth Summ.* 1: 218 (1971) and 2: 507 & 943. 1971.

ERIOCAULON THWAITESII Körn., *Linnaea* 27: 627—628. 1856.

Additional bibliography: Fyson, *Journ. Indian Bot.* 1: 50 & 53. 1919; Rao & Kumari, *Bull. Bot. Surv. India* 9: 189. 1967; Moldenke, *Phytologia* 20: 22. 1970; Moldenke, *Fifth Summ.* 1: 275 & 281 (1971) and 2: 505, 514, 515, & 943. 1971; Moldenke, *Phytologia* 23: 422. 1972.

ERIOCAULON TOFIELDIFOLIUM Schinz, *Bull. Herb. Boiss.*, sér. 2, 1: 779. 1901.

Additional bibliography: H. Hess, *Bericht. Schweiz. Bot. Ges.* 67: 87 & 89. 1957; Moldenke, *Phytologia* 19: 464—467, 469, & 470. 1970; Moldenke, *Fifth Summ.* 1: 254 & 256 (1971) and 2: 514 & 943. 1971.

Kers reports finding this species to be "very local among rich swamp vegetation at a spring, growing with Lobelia sp." in South-west Africa.

Additional citations: NAMIBIA: Kers 755 (S).

ERIOCAULON TOGOENSE Moldenke, *Known Geogr. Distrib. Erioc.* 20, 21, & 41, nom. nud. (February 9, 1946), *Phytologia* 2: 134. July 8, 1946.

Additional bibliography: Moldenke, *Phytologia* 19: 467—468 (1970) and 20: 28. 1970; Moldenke, *Fifth Summ.* 1: 209, 210, 216, 219, 221, & 222 (1971) and 2: 494, 516, & 943. 1971.

Salisbury (1953) erroneously cites the original publication of this binomial to page "42", where it does not occur.

ERIOCAULON TONKINENSE Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 72. 1903.

Additional bibliography: Moldenke, *Phytologia* 19: 468. 1970; Moldenke, *Fifth Summ.* 1: 301 (1971) and 2: 943. 1971.

ERIOCAULON TORTUOSUM F. Muell., *Fragm.* 1: 91—92. 1859.

Additional bibliography: Moldenke, *Phytologia* 2: 376 (1947) and 19: 468. 1970; Moldenke, *Fifth Summ.* 1: 346 (1971) and 2: 943. 1971.

*ERIOCAULON TOUMOUENSE* Moldenke, Résumé Suppl. 17: 4 & 10, nom. nud. (1968), Phytologia 19: 468. 1970.

Additional bibliography: G. Taylor, Ind. Kew. Suppl. 14: 54. 1970; Moldenke, Biol. Abstr. 51: 9629. 1970; Moldenke, Phytologia 19: 468--469 (1970) and 20: 281. 1970; Anon., Biol. Abstr. 51 (17): B.A.S.I.C. S.72. 1970; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1970: 25. 1971; Moldenke, Excerpt. Bot. A.18: 445. 1971; Moldenke, Fifth Summ. 1: 217 (1971) and 2: 502 & 943. 1971.

*ERIOCAULON TRANSVAALICUM* N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 54. 1897.

Additional bibliography: H. Hess, Bericht. Schweiz. Bot. Ges. 67: 87 & 89. 1957; Moldenke, Phytologia 20: 22. 1970; C. C. Townsend, Excerpt. Bot. A.15: 418. 1970; Moldenke, Fifth Summ. 1: 223, 237, 243, & 256 (1971) and 2: 943. 1971; Lewalle, Bull. Jard. Nat. Belg. 42 [Trav. Univ. Off. Bujumb. Fac. Sci. C.20]: 43, 46, & [232]. 1972.

Lewalle (1972) describes the leaves of this plant as producing rosettes, and the flowers as gray. He found it growing at 800 m. altitude, flowering in October. He cites his no. 1419.

Additional citations: BURUNDI: Lewalle 6176 (Z).

*ERIOCAULON TRANSVAALICUM* var. *HANNINGTONII* (N. E. Br.) Meikle, Kew Bull. 22: 142. 1968.

Additional bibliography: Moldenke, Phytologia 19: 462 & 471. 1970; C. C. Townsend, Excerpt. Bot. A.15: 418. 1970; Moldenke, Fifth Summ. 1: 237 & 251 (1971) and 2: 495, 502, & 943. 1971.

*ERIOCAULON TRILOBATUM* Ruhl. in Engl., Bot. Jahrb. 27: 811. 1899.

Additional bibliography: Moldenke, Phytologia 19: 471--472. 1970; Moldenke, Fifth Summ. 1: 261 (1971) and 2: 943. 1971.

Additional citations: MADAGASCAR: Bogner 336 (Mu).

*ERIOCAULON TRILOBATUM* var. *GLABRESCENS* Moldenke, Phytologia 3: 417. 1951.

Additional bibliography: Moldenke, Phytologia 19: 472. 1970; Moldenke, Fifth Summ. 1: 261 (1971) and 2: 943. 1971.

*ERIOCAULON TRISECTOIDES* Satake in Hara, Univ. Mus. Univ. Tokyo Bull. 2: 159--160, fig. 12. 1971.

Bibliography: Satake in Hara, Univ. Mus. Univ. Tokyo Bull. 2: 159--160, fig. 12. 1971; Moldenke, Phytologia 23: 422. 1972.

Illustrations: Satake in Hara, Univ. Mus. Univ. Tokyo Bull. 2: 160, fig. 12. 1971.

Satake (1971) describes the type locality and collection as "Nepal. Mul Pokhari-Dumhan, 2100--700 m (H. Hara, H. Kanai, S. Kurosawa, G. Murata, M. Togashi & T. Tuyama, Oct. 30, 1963 -- holotype in TI)" and cites also "Dumhan-Taplejung, 700--2000 m (Nov. 1, 1963): Khebang-Bharomdin, 1700--1000 m (Nov. 24, 1963); Chyangthaphu-Birwa, 1200--2400 m (Nov. 27, 1963)." He comments that "The new species resembles Eriocaulon nepalense, but differs

from it in having male sepals deeply trisected and subglabrous. The plant is near, on the other hand, to E. trisectum described from Formosa in trisected male sepals, however, the latter has pilose male and female sepals and glandulose female petals."

ERIOCAULON TRISECTUM Satake, Journ. Jap. Bot. 15: 144, fig. 2. 1939.

Additional bibliography: Moldenke, Phytologia 3: 144 (1949) and 19: 473. 1970; Satake in Hara, Univ. Mus. Univ. Tokyo Bull. 2: 160. 1971; Moldenke, Fifth Summ. 1: 313 (1971) and 2: 943. 1971.

ERIOCAULON TRUNCATUM Hamilt. ex Mart. in Wall., Pl. Asiat. Rar. 3: 29. 1832.

Additional bibliography: Fyson, Journ. Indian Bot. 1: 50. 1919; Hare, Journ. Linn. Soc. Lond. Bot. 53: 443. 1950; Darlington & Wylie, Chrom. Atl., pr. 1, 340 (1956) and pr. 2, 340. 1961; Burkill, Dict. Econ. Prod. Malay Penins. 1: 590. 1966; Santapau, Excerpt. Bot. A.11: 176. 1967; Hansen, Excerpt. Bot. A.12: 520. 1967; Mitra, Elem. Syst. Bot. Angiosp., ed. 2 abrdg., 165. 1967; Rao & Verma, Bull. Bot. Surv. India 11: 412. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 186 & 191. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl. 274. 1969; Moldenke, Phytologia 20: 22, 23, 28, & 31. 1970; Satake in Hara, Univ. Mus. Univ. Tokyo Bull. 2: 156. 1971; Moldenke, Fifth Summ. 1: 268, 275, 281, 283, 289, 292, 293, 296, 298, 301, 305, 307, 310, 316, 324, & 362 (1971) and 2: 496, 501, 505, 515, & 943. 1971; Moldenke, Phytologia 24: 459. 1972.

Brooke found this plant growing in poor wet soil on an airfield. Burkill (1966) records the vernacular names "rumput darya" (river-grass) and, erroneously, "rumput durian". Jarrett & Saldanha call it a "common herb in shallow pools", while Saldanha refers to it as "locally common herb with white heads in slightly marshy soil" in Mysore, India. It has been found growing at altitudes up to 1100 meters in open wet grasslands. Datta & Majumdar (1966) describe it as a "Submerged aquatic herb. Leaves subulate. Receptacle glabrous. Male and female flowers with 2 sepals. Flowering from September to November. Indigenous to India."

Material of this species has been misidentified and distributed in some herbaria under the name E. gracile Mart.

Additional citations: INDIA: Kerala: Manilal 4 (Ac). Mysore: Jarrett & Saldanha HFP.744 (W); Saldanha 15327 (W). THAILAND: Charoenphol, Larsen, & Warncke 4684 (Ac). GREATER SUNDA ISLANDS: Sarawak: W. M. A. Brooke 10796 (W-2332133). Sumatra: Boesa 6138 (N).

ERIOCAULON TRUNCATUM var. DISEPALUM Fyson, Journ. Indian Bot. 2: 199. 1921.

Additional bibliography: Moldenke, Phytologia 19: 476 & 479. 1970; Moldenke, Fifth Summ. 2: 943 & 969. 1971.

ERIOCAULON TRUNCATUM var. MALACCENSE Hook. f., Fl. Brit. India 6:

578. 1893.

Additional bibliography: Moldenke, *Phytologia* 19: 477 & 479—480. 1970; Moldenke, *Fifth Summ.* 1: 305 (1971) and 2: 943. 1971.

*ERIOCAULON TRUNCATUM* var. *QUADRICOSTATUM* H. Lecomte, *Not. Syst.* 2: 214—215 (as "quadricostata"). 1912.

Additional & emended bibliography: H. Lecomte, *Not. Syst.* 2: 214—215. 1912; Moldenke, *Phytologia* 19: 480. 1970; Moldenke, *Fifth Summ.* 1: 301 (1971) and 2: 515 & 943. 1971.

*ERIOCAULON TUBIFLORUM* Van Royen, *Nov. Guin., new ser.*, 10: 35. 1959.

Additional bibliography: K. U. Kramer, *Excerpt. Bot. A.6*: 33. 1963; Moldenke, *Phytologia* 19: 480—481. 1970; G. Taylor, *Ind. Kew. Suppl.* 14: 54. 1970; Moldenke, *Fifth Summ.* 1: 336 (1971) and 2: 495 & 943. 1971.

*ERIOCAULON UBOENSE* H. Lecomte, *Journ. de Bot.* 21 [sér. 2, 1]: 89 & 109, fig. 1. 1908.

Additional bibliography: Moldenke, *Phytologia* 2: 376. 1947; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 171 & 189. 1969; Moldenke, *Phytologia* 19: 481—482 (1970) and 20: 26. 1970; Moldenke, *Fifth Summ.* 1: 296 & 301 (1971) and 2: 515 & 943. 1971.

*ERIOCAULON ULAEI* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 47—48. 1903.

Additional & emended bibliography: Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 4, 17, 18, 42, 47—48, & 287. 1903; Ruhl. in Urb., *Engl. Bot. Jahrb.* 37: 519. 1906; Moldenke, *Phytologia* 19: 482 (1970) and 21: 276. 1971; Moldenke, *Fifth Summ.* 1: 150 (1971) and 2: 515, 773, & 943. 1971.

The *Ule* 1689, identified by Ruhland as "*Eriocaulon Ulei* Ruhl.", is actually the type collection of *E. magnificum* Ruhl.

*ERIOCAULON ULAEI* var. *RADIOSUM* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 48. 1903.

Additional bibliography: Moldenke, *Phytologia* 19: 482. 1970; Moldenke, *Fifth Summ.* 1: 150 (1971) and 2: 515 & 943. 1971.

*ERIOCAULON USSURIENSE* Körn. in Regel, *Tent. Fl. Ussur.* 157. 1861.

Additional bibliography: Körn. in Mart., *Fl. Bras.* 3 (1): 503. 1863; Moldenke, *Phytologia* 19: 482—483. 1970; Moldenke, *Fifth Summ.* 1: 208 & 289 (1971) and 2: 943. 1971.

*ERIOCAULON VANHEURCKII* Muell.-Arg. ex Muell.-Arg. & Van Heurck in Van Heurck, *Obs. Bot.* 98. 1870.

Additional synonymy: *Eriocaulon vanheurckii* Muell.-Arg. apud Santapau & Shah, *Journ. Bombay Nat. Hist. Soc.* 66: 440, sphalm. 1969.

Additional & emended bibliography: Fyson, *Journ. Indian Bot.* 1: 50, 51, & 53, fig. 7. 1919; Moldenke, *Phytologia* 2: 376. 1947; San-

tapau & Shah, Journ. Bombay Nat. Hist. Soc. 66: 440. 1969; Moldenke, Phytologia 19: 483—484. 1970; Moldenke, Fifth Summ. 1: 276 & 280 (1971) and 2: 503, 514, 516, & 943. 1971.

Additional illustrations: Fyson, Journ. Indian Bot. 1: 51, fig. 7. 1919.

Fyson (1919) implies in his text that his fig. 7 represents E. sexangulare L., but its legend plainly states that it is meant to illustrate E. thomasi Fyson (now regarded as E. vanheurckii).

ERIOCAULON VANHEURCKII f. MINIMUM Moldenke, Phytologia 5: 84. 1954.

Additional bibliography: Moldenke, Phytologia 19: 484. 1970; Moldenke, Fifth Summ. 1: 276 (1971) and 2: 943. 1971.

ERIOCAULON VAUPESENSE Moldenke, Bot. Mus. Leaflet. Harvard Univ. 18: 124. 1958.

Additional bibliography: Hocking, Excerpt. Bot. A.5: 436. 1962; Anon., Excerpt. Bot. A.6: 458. 1963; Moldenke, Phytologia 19: 484—485. 1970; Moldenke, Fifth Summ. 1: 116 (1971) and 2: 943. 1971.

ERIOCAULON VITTIFOLIUM H. Lecomte, Bull. Soc. Bot. France 55: 645—646. 1909.

Additional & emended bibliography: H. Hess, Bericht. Schweiz. Bot. Ges. 67: 89 & 90. 1957; Moldenke, Phytologia 19: 485—487. 1970; Moldenke, Fifth Summ. 1: 217, 230, 243, & 246 (1971) and 2: 943. 1971.

ERIOCAULON VOLKENSII Engl., Pflanzenw. Ost-Afr. C: 133. 1895.

Additional bibliography: Moldenke, Phytologia 2: 375 & 379 (1947) and 19: 487—488. 1970; Moldenke, Fifth Summ. 1: 234, 237, & 241 (1971) and 2: 943. 1971.

ERIOCAULON WALKERI Hook. f., Fl. Brit. India 6: 583. 1893.

Additional bibliography: Moldenke, Phytologia 19: 488. 1970; Moldenke, Fifth Summ. 1: 281 (1971) and 2: 510 & 943. 1971.

Ruhland (1903), as usual, dates the original publication of this binomial as "1894", but pages 449—672 of Hooker's work were actually published and issued in 1893.

ERIOCAULON WELWITSCHII Rendle, Cat. Afr. Pl. Welw. 2 (1): 97—98. 1899.

Additional bibliography: Moldenke, Phytologia 19: 452 & 488—489. 1970; Moldenke, Fifth Summ. 1: 210, 237, 243, 248, 254, & 256 (1971) and 2: 509, 516, & 943. 1971.

ERIOCAULON WHANGII Ruhl., Notizbl. Bot. Gart. Berlin 10: [1040]—1041. 1930.

Additional bibliography: Moldenke, Phytologia 19: 490. 1970; Moldenke, Fifth Summ. 1: 289 (1971) and 2: 943. 1971.

ERIOCAULON WIGHTIANUM Mart. in Wall., Pl. Asiat. Rar. 3: 28. 1832.

Additional bibliography: Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. 17 (1): 29. 1835; Fyson, Journ. Indian Bot.

1: 50. 1919; Moldenke, *Phytologia* 20: 22. 1970; Hocking, *Excerpt. Bot. A.18*: 444. 1971; Moldenke, *Fifth Summ.* 1: 268, 276, 281, 283, & 285 (1971) and 2: 508, 511, 512, 516, & 943. 1971.

The 1835 Martius reference cited above is often cited by authors as "1833", the date of submission of the manuscript to the Academy. According to the late Dr. J. H. Barnhart, it was not actually published until 1835.

Recent collectors have encountered this species on wet flooded grasslands, flowering and fruiting in November.

The Nicolson, Saldanha, & Ramamoorthy HFP.39, distributed as E. wightianum, is actually E. polycephalum Hook. f.

Eriocaulon wightianum has been recorded from Ceylon on the basis of Thwaites C.P.3382 from the Ambagamowa District. However, Thwaites & Hooker (1864) actually were of the opinion that this collection represents a variety which they did not name but which they described as "var. capitulis nigro-cinereis parce pilosis".

Additional citations: INDIA: Kerala: Cook & Gut 235 (Rf).

ERIOCAULON WIGHTIANUM var. HELPERI Hook. f. ex Fyson, *Journ. Indian Bot.* 2: 266, pl. 22. 1921.

Additional bibliography: Fyson, *Journ. Indian Bot.* 1: 50. 1919; Moldenke, *Phytologia* 19: 492. 1970; Moldenke, *Fifth Summ.* 1: 285 (1971) and 2: 502 & 943. 1971.

ERIOCAULON WIGHTIANUM f. VIVIPARUM Moldenke, *Phytologia* 18: 342. 1969.

Additional bibliography: Moldenke, *Biol. Abstr.* 50: 12948. 1969; Moldenke, *Phytologia* 19: 492. 1970; Hocking, *Excerpt. Bot. A.18*: 444. 1971; Moldenke, *Fifth Summ.* 1: 276 (1971) and 2: 943. 1971.

ERIOCAULON WILLDENOVIANUM Moldenke, *Phytologia* 19: 492--496. 1970.

Additional synonymy: Eriocaulon willdenowianum Moldenke, *Excerpt. Bot. A.18*: 445, sphalm. 1971.

Additional bibliography: Fyson, *Journ. Indian Bot.* 1: 50. 1919; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 172, 184--186, 189, & 191. 1969; Moldenke, *Biol. Abstr.* 51: 9629. 1970; Moldenke, *Phytologia* 20: 22--24. 1970; Moldenke, *Excerpt. Bot. A.18*: 445. 1971; Moldenke, *Fifth Summ.* 1: 261, 264, 281, 283, 285, 289, 294, 296, 301, 305, 316, 320, 324, 330, 336, & 338 (1971) and 2: 492, 500, 503, 505, 512, 792, 943, & 972. 1971; Moldenke, *Phytologia* 23: 431 (1972) and 24: 339, 345, & 350. 1972.

The record of this species from Sudest island, as noted by me in my 1970 and 1971 works, was based on Brass 28178, which, however, now has proved to be E. australe R. Br. instead.

ERIOCAULON WILLDENOVIANUM f. VIVIPARUM (Moldenke) Moldenke, *Phytologia* 20: 24. 1970.

Additional bibliography: Moldenke, *Phytologia* 20: 24. 1970; Moldenke, *Fifth Summ.* 1: 324 (1971) and 2: 505 & 943. 1971.

Brooke found this plant growing in pools in the sand at the

edge of an airfield, flowering and fruiting in April.

Additional citations: GREATER SUNDA ISLANDS: Sarawak: W. M. A. Brooke 8357 (W--2319632).

ERIOCAULON WILLIAMSII Moldenke, N. Am. Fl. 19: 36. 1937.

Additional bibliography: Moldenke, Phytologia 20: 24--25. 1970; Moldenke, Fifth Summ. 1: 81 & 90 (1971) and 2: 943. 1971.

ERIOCAULON WOODII N. E. Br. in Thiselton-Dyer, Fl. Cap. 7: 57. 1897.

Additional bibliography: Moldenke, Phytologia 20: 25--26. 1970; Moldenke, Fifth Summ. 1: 256 (1971) and 2: 501, 507, & 943. 1971.

ERIOCAULON WOODII var. MINOR Ruhl. in Engl., Pflanzenreich 13 (4-30): 70. 1903.

Additional bibliography: Moldenke, Phytologia 20: 25--26. 1970; Moldenke, Fifth Summ. 1: 248 & 256 (1971) and 2: 943. 1971.

ERIOCAULON WOODSONIANUM Moldenke in Woodson & Schery, Ann. Mo. Bot. Gard. 27: 268--269. 1940.

Additional bibliography: Moldenke, Phytologia 20: 26. 1970; Moldenke, Fifth Summ. 1: 90 (1971) and 2: 943. 1971.

ERIOCAULON XENOPODION Koyama, Philip. Journ. Sci. 84: 374--375, pl. 4. 1956.

Additional bibliography: Moldenke, Phytologia 20: 26. 1970; Moldenke, Fifth Summ. 1: 296 (1971) and 2: 516 & 944. 1971.

ERIOCAULON XERANTHEMUM Mart. in Wall., Pl. Asiat. Rar. 3: 29. 1832.

Additional synonymy: Eriocaulon xeranthemum Mart. ex Fyson, Journ. Indian Bot. 1: 50, sphalm. 1919.

Additional bibliography: Fyson, Journ. Indian Bot. 1: 50 & 52. 1919; Moldenke, Phytologia 20: 26--28, 413, 414, & 417 (1970) and 21: 428. 1971; Moldenke, Fifth Summ. 1: 268, 270, 276, 283, 305, & 324 (1971) and 2: 509, 516, & 944. 1971.

Additional citations: INDIA: Kerala: Manilal 2 (Ac).

ERIOCAULON YAOSHANENSE Ruhl., Notizbl. Bot. Gart. Berlin 10: 1043--1044. 1930.

Additional bibliography: Moldenke, Phytologia 20: 28. 1970; Moldenke, Fifth Summ. 1: 289 (1971) and 2: 944. 1971.

ERIOCAULON YOSHINOI Nakai, Bull. Géogr. Bot. 21: 139--140. 1911.

Additional & emended bibliography: Nakai, Bull. Géogr. Bot. 21: 139--140. 1911; Moldenke, Phytologia 20: 29. 1970; Moldenke, Fifth Summ. 1: 289 & 310 (1971) and 2: 944. 1971.

This species is based on Z. Yoshino s.n., collected at Hongomura, in the province of Bitchua, Honshu, Japan, in October, 1910.

ERIOCAULON YUNNANENSE Moldenke, Phytologia 2: 221. 1970.

Additional bibliography: Moldenke, Phytologia 20: 29. 1970; Moldenke, Fifth Summ. 1: 289 (1971) and 2: 944. 1971.

*ERIOCAULON ZAMBESIENSE* Ruhl. in Engl., Bot. Jahrb. 27: 75—76. 1899.

Additional bibliography: Moldenke, Phytologia 20: 29. 1970; Moldenke, Fifth Summ. 1: 222, 237, 246, & 249 (1971) and 2: 517 & 944. 1971.

Lewalle describes the leaves of this species as forming a rosette and the flowers as gray, and found the plant growing in marshes at 1800 meters altitude, flowering in June.

Additional citations: BURUNDI: Lewalle 5937 (Z).

*ERIOCAULON ZOILLINGERIANUM* Körn., Linnaea 27: 682—683. 1856.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161, 162, 171, 173, & 189. 1969; Moldenke, Biol. Abstr. 51: 5887. 1970; Moldenke, Phytologia 20: 29—31. 1970; Hocking, Excerpt. Bot. A.19: 43. 1971; Moldenke, Fifth Summ. 1: 296, 301, 316, 324, & 336 (1971) and 2: 492 & 944. 1971.

Additional citations: THAILAND: K. Larsen 8070 (S).

*ERIOCAULON ZYTANII* Satake, Bot. Mag. Tokyo 51: 287—288, fig. 2. 1937.

Additional bibliography: Ohwi, Fl. Jap., [Jap. ed.], 262—264 & 1296. 1953; Koyama in Ohwi, Fl. Jap., [Engl. ed.], 265 & 267. 1965; Moldenke, Phytologia 20: 31—32. 1970; Moldenke, Biol. Abstr. 51: 11903. 1970; Moldenke, Excerpt. Bot. A.18: 445. 1971; Moldenke, Fifth Summ. 1: 311 (1971) and 944. 1971.

Koyama (1965) records the vernacular variant "izu-no-shima-hoshi-kusa" for this species.

*LACHNOCAULON* Kunth, Enum. Pl. 3: 497. 1841.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, 2: 206. 1791; Arech., Anal. Mus. Montevid. 4 (1): 19. 1902; Saunders, Ann. Bot. 39: 157 & 158, fig. 68. 1925; Tharp, Veg. Tex. 47. 1939; A. C. Martin, Am. Midl. Nat. 36: 533 & 654, pl. 4. 1946; Hocking, Excerpt. Bot. A.11: 552. 1967; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 147—149, 154—158, 162, 163, 168—170, 173, 175—177, 180, 181, 184, & 187—190, fig. 32 L, 33 M, 35 H, 36 E & F, & 38 E & F. 1969; Moldenke, Biol. Abstr. 51: 11903. 1970; Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1806, 1838, & 1856. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 353 & 354. 1970; Anon., Biol. Abstr. 51 (21): B.A.S.I.C. S.122. 1970; Britton & Br., Illustr. Fl., ed. 2, pr. 5, 1: 453, 455—456, & 679, fig. 1145 (1970) and ed. 2, pr. 5, 3: 575, 581, & 625. 1970; Moldenke, Phytologia 20: 8, 9, 32—52, 80—83, 252, 296, & 417 (1970) and 20: 508 & 511. 1971; Moldenke, Fifth Summ. 1: 21—24, 26, 28, 29, 31, 32, 48, 55, 96, 99, & 293 (1971) and 2: 499, 505, 509, 516, 517, 533, 534, 746, & 944. 1971; Moldenke, Biol. Abstr. 52: 1321. 1971; Anon., Biol. Abstr. 52 (3): B.A.S.I.C. S.78 & S.129. 1971; Long & Lakela, Fl. Trop. Fla. 259, 260, 262, 931, & 944. 1971; Moldenke, Excerpt. Bot. A.18: 445 (1971) and A.19: 43. 1971; Thieret, La. Soc. Hort. Res. 13: 18 & 41. 1972.

Martin (1946) confirms the fact that the seeds in this genus do

have endosperm. Tharp (1939) avers that in Texas it occurs only in the longleaf pine region. Long & Lakela (1971) give "bog buttons" as the common name for the genus as a whole.

LACHNOCAULON ANCEPS (Walt.) Morong, Bull. Torrey Bot. Club 18: 360. 1891.

Additional synonymy: Eriocavlon anceps Raesch., Nom. Bot. 30. 1797.

Additional & emended bibliography: J. F. Gmel in L., Syst. Nat., ed. 13, 2: 206. 1791; Saunders, Ann. Bot. 39: 157 & 158, fig. 68. 1925; Hocking, Excerpt. Bot. A.6: 455. 1963; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 162, 189, & 190. 1969; Moldenke, Biol. Abstr. 51: 11903. 1970; Moldenke, Phytologia 20: 8, 9, 35--48, 51, 52, 82, 83, & 417. 1970; Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1806, 1838, & 1856. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 353 & 354. 1970; Britton & Br., Illustr. Fl., ed. 2, pr. 5, 1: 455--456, fig. 1145. 1970; Long & Lakela, Fl. Trop. Fla. 260, 262, & 938. 1971; Moldenke, Excerpt. Bot. A.18: 445. 1971; Moldenke, Fifth Summ. 1: 21, 22, 24, 26, 28, 31, 32, 48, 55, 99, & 293 (1971) and 2: 516, 517, 533, 534, & 944. 1971; Thieret, La. Soc. Hort. Res. 13: 18. 1972.

Additional & emended illustrations: Saunders, Ann. Bot. 39: 158, fig. 68. 1925; Britton & Br., Illustr. Fl., ed. 2, pr. 5, 1: 456, fig. 1145. 1970.

The Lundells describe this plant as a "perennial". Cory describes it as having "scapes thrice as long as leaves, to 1.5 dm. tall, forming mats in wet sandy places in open woods".

Material of this species has been misidentified and distributed in herbaria as Eriocaulon kornickianum Van Heurck & Muell.-Arg.

Additional citations: TEXAS: Hardin Co.: Cory 52778 (M1); Lundell & Lundell 11152 (Au--288872).

LACHNOCAULON ANCEPS f. GLABRESCENS Moldenke, Phytologia 8: 160. 1962.

Additional bibliography: Moldenke, Phytologia 20: 41, 45, & 48. 1970; Moldenke, Fifth Summ. 1: 29 (1971) and 2: 944. 1971.

LACHNOCAULON BEYRICHIANUM Sporleder ex Körn., Linnaea 27: 567--568. 1856.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 189. 1969; Moldenke, Phytologia 20: 35, 36, 41, 45--48, 52, 82, & 83. 1970; Moldenke, Fifth Summ. 1: 23, 24, 26, & 29 (1971) and 2: 944. 1971.

LACHNOCAULON CUBENSE Ruhl. in Fedde, Repert. Spec. Nov. 22: 34. 1925.

Additional bibliography: Moldenke, Phytologia 20: 47. 1970; Moldenke, Fifth Summ. 1: 96 (1971) and 2: 944. 1971.

LACHNOCAULON DIGYNUM Körn., Linnaea 27: 570--571. 1856.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 189. 1969; Moldenke, *Phytologia* 20: 36, 39, 41, 45, & 47—48. 1970; Moldenke, *Fifth Summ.* 1: 29, 31, & 32 (1971) and 2: 499, 533, & 944. 1971.

Additional citations: ALABAMA: Mobile Co.: F. W. Pennell 4474 (Mi).

*LACHNOCAULON ECILIATUM* Small, *Fl. SE. U. S.*, ed. 1, 235 & 1328. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 36, 48—50, 52, & 82. 1970; Long & Lakela, *Fl. Trop. Fla.* 262 & 938. 1971; Moldenke, *Fifth Summ.* 1: 29 (1971) and 2: 944. 1971.

*LACHNOCAULON EKMANNII* Ruhl. in Fedde, *Repert. Spec. Nov.* 22: 34. 1925.

Additional bibliography: Moldenke, *Phytologia* 20: 49. 1970; Moldenke, *Fifth Summ.* 1: 96 (1971) and 2: 533 & 944. 1971.

*LACHNOCAULON ENGLERI* Ruhl. in Engl., *Pflanzenreich* 13 (4—30): 241. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 148, 149, 162, 168, 169, 180, 181, 184, 187, & 190, fig. 35 H & 38 E & F. 1969; Moldenke, *Phytologia* 20: 36, 49—52, 82, & 252. 1970; Moldenke, *Fifth Summ.* 1: 29 (1971) and 2: 499, 505, 509, 533, & 944. 1971.

Additional illustrations: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 168 & 180, fig. 35 H & 38 E & F. 1969.

*LACHNOCAULON FLORIDANUM* Small, *Fl. SE. U. S.*, ed. 1, 235 & 1328. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 36, 40, 41, 51, & 52. 1970; Long & Lakela, *Fl. Trop. Fla.* 262 & 938. 1971; Moldenke, *Fifth Summ.* 1: 29 (1971) and 2: 944. 1971.

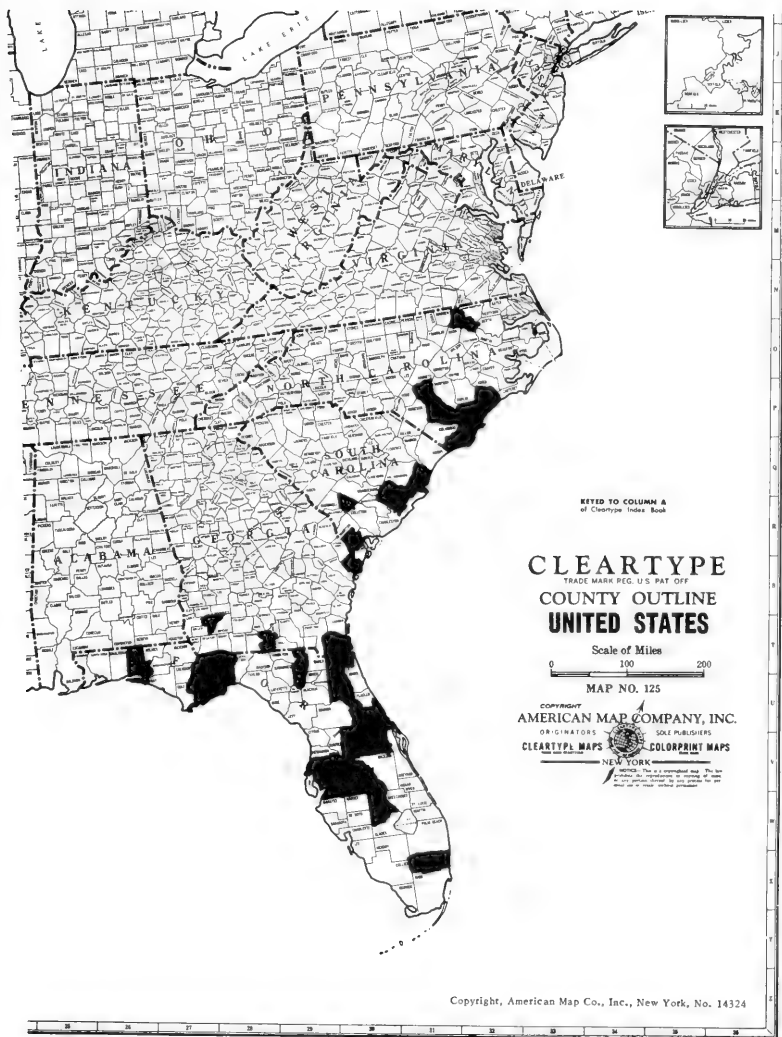
*LACHNOCAULON GLABRUM* Körn., *Linnaea* 27: 568—569. 1856.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 173, 187, & 189. 1969; Moldenke, *Phytologia* 20: 81 & 82. 1970; Moldenke, *Biol. Abstr.* 51: 11903 (1970) and 52: 1321. 1971; Anon., *Biol. Abstr.* 52 (3): B.A.S.I.C. S.129. 1971; Long & Lakela, *Fl. Trop. Fla.* 262 & 938. 1971; Moldenke, *Excerpt. Bot.* A.18: 445 (.971) and A.19: 43. 1971; Moldenke, *Fifth Summ.* 1: 29 & 31 (1971) and 2: 944. 1971.

*LACHNOCAULON MINUS* (Chapm.) Small, *Fl. SE. U. S.*, ed. 1, 235 & 1328. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 149, 154—157, 162, 163, 176, 177, 184, 187, & 190, fig. 32 L, 33 M, & 36 E & F. 1969; Moldenke, *Phytologia* 20: 81—83 & 252. 1970; Moldenke, *Biol. Abstr.* 52: 1321. 1971; Anon., *Biol. Abstr.* 52 (3): B.A.S.I.C. S. 129 & S.131. 1971; Long & Lakela, *Fl. Trop. Fla.* 260, 262, & 938. 1971; Moldenke, *Excerpt. Bot.* A.19: 43. 1971; Moldenke, *Fifth Summ.* 1: 23, 24, 26, & 29

Figure 7. Distribution of Lachnocaulon mims in the United States [mapping by counties by Andrew R. Moldenke; curators of herbaria having material of this species from additional counties are asked to send it to the author]



(1971) and 2: 533 & 944. 1971.

Additional illustrations: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 154, 156, & 176, fig. 32 L, ss M, & 36 E & F. 1969.

*LEIOTHRIX* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 225--239. 1903  
[not *Leiothrix* Swainson, 1832 (*Aves*)].

Additional & emended bibliography: J. F. Macbr., *Field Mus. Publ. Bot.* 13 (363): 492. 1936; Kunth, *Emm. Pl.* 3: 522--524, 526, 530, 538, 539, 572, 574, 575, 577, 578, & 580. 1841; Burkill, *Trans. Linn. Soc. Lond. Bot.*, ser. 2, 6: 13. 1901; N. E. Br., *Trans. Linn. Soc. Lond. Bot.*, ser. 2, 6: 69 & 70. 1901; Arech., *Anal. Mus. Montevid.* 4 (1): 24. 1902; Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 2, 3, 8, 14--16, 19--22, 25--30, 121, 165, 223, 225--239, & [283]--291, fig. 33 & 34. 1903; Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 296--299, fig. 12 B 14--21 & C 22--29. 1908; J. A. Steyerma., *Act. Bot. Venez.* 1: 15, 22, 69, 98, & 208. 1966; Dau, *Excerpt. Bot. A.* 7: 520. 1964; Hocking, *Excerpt. Bot. A.* 11: 450. 1967; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 147, 149, 158--162, 166--168, 170, 173--179, 182--188, 190, & 191, fig. 35 F, 36 G & H, 37 H & K--M, & 39 K. 1969; Angely, *Fl. Anal. Fitogeogr. Est. S. Paulo* 2: xxxiii. 1970; Reitz, *Sellowia* 22: 80. 1970; Moldenke, *Phytologia* 20: 82--120, 248--265, 294, 296, & 355 (1970), 20: 508 & 511 (1971), and 21: 352 & 508. 1971; Moldenke, *Biol. Abstr.* 52: 719, 1321, & 10547. 1971; Anon., *Biol. Abstr.* 52 (2): B.A.S.I.C. S.133 (1971), 52 (3): B.A.S.I.C. S.129 & S.131 (1971), and 52 (19): B.A.S.I.C. S.143 & S.196. 1971; Hocking, *Excerpt. Bot. A.* 19: 43. 1971; Moldenke, *Excerpt. Bot. A.* 19: 43. 1971; Moldenke, *Fifth Summ.* 1: 124, 129, 130, 142, 153--155, 183, 189, & 478--487 (1971) and 2: 492, 496, 497, 499--502, 504, 506, 508, 509, 511, 513, 515, 516, 546--548, 569, 577--592, 632, 633, 644, 739--743, 748, 789, 944--946, & 968. 1971; Moldenke, *Phytologia* 23: 418, 454, & 508 (1972) and 24: 498 & 510. 1972.

As indicated above, there is a genus of birds [in the family *Timaliidae*, the "babbling thrushes" or "babblers", of the *Passeriformes*], *Leiothrix* Swainson [W. Swainson in Swainson & Richardson, *Fauna Boreali Americana* 2: 490. 1832 ["1831"]], consisting of 7 species ranging from the Himalayan foothills west through southern China (not north to Peking), Burma, etc., including *L. lutea*, the Pekin Robin, from the Himalayas and southern China, and *L. argentauris*, the Silver-eared Mesia, from the Himalayas to Indochina. The former is often called the "Pekin Nightingale", but is actually not a nightingale and does not sing like one. It is now established in Hawaii, where it swarms in the brush of the mountains but does not occur in the lowland backyards or towns.

The Vareschi & Foldats 4898, distributed as "*Leiothrix* sp.", is actually *Paepalanthus convexus* Gleason.

*LEIOTHRIX AFFINIS* Alv. Silv., *Fl. Mont.* 1: 286. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 86--87 & 260. 1970; Moldenke, *Biol. Abstr.* 52: 1321. 1971; Moldenke, *Excerpt. Bot. A.* 19: 43. 1971; Moldenke, *Fifth Summ.* 1: 153 (1971)

and 2: 546 & 944. 1971.

LEIOTHRIX AMAZONICA Moldenke, Résumé 91 & 484, nom. nud. (1959), Bol. Mus. Para. Goeldi, new ser., Bot. 3: 1. 1960.

Additional bibliography: Dau, Excerpt. Bot. A.7: 520. 1964; Moldenke, Phytologia 20: 87. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 944. 1971.

LEIOTHRIX ANGUSTIFOLIA (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 231. 1903.

Emended synonymy: Paepalanthus angustifolius Körn. in Mart., Fl. Bras. 3 (1): 424-425. 1863.

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 231, [283], 288, & 289. 1903; Moldenke, Phytologia 20: 87. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 478, 546, 577, & 944. 1971.

LEIOTHRIX ARAXAENSIS Alv. Silv., Fl. Mont. 1: 307-308, pl. 195. 1928.

Additional bibliography: Moldenke, Phytologia 20: 87-88. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 546 & 944. 1971.

LEIOTHRIX ARECHAVALETAE (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 238-239. 1903.

Emended synonymy: Paepalanthus arechavaletae Körn. ex Arech., Anal. Mus. Montevid. 4 (1): 24. 1902. Leiothrix arechavaletae Ruhl. in Engl., Pflanzenreich 13 (4-30): 238 1903. Paepalanthus arechavaletae Ruhl. in Engl., Pflanzenreich 13 (4-30): 8 & 289. 1903. Paepalanthus arechavataelae Körn. ex Moldenke, Résumé 323, in syn. 1959.

Additional & emended bibliography: Arech., Anal. Mus. Montevid. 4 (1): 24. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 8, 235, 238-239, 288, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 101 & 126. 1908; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 43 & 54. 1930; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 178, 179, 185, 186, & 191, fig. 37 K & L. 1969; Moldenke, Phytologia 20: 88. 1970; Moldenke, Fifth Summ. 1: 189 (1971) and 2: 546, 577, & 944. 1971.

Illustrations: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 178, fig. 37 K & L. 1969.

Unfortunately, in all my previous publications on this taxon I accredited it merely to Ruhland, but it now appears that Herter (1954) was correct in citing it as "(Körn.) Ruhl." Although Ruhland does not specifically say so, it would seem that his Leiothrix arechavaletae is based on a part of the same Arechavaleta collections on which Körnicke's Paepalanthus arechavaletae is based. Arechavaleta's original publication of Körnicke's binomial (1902) is prefaced by a description of the genus Paepalanthus as a whole and then the statement "Hasta el presente entre nosotros, solo se ha encontrado una especie de este género, determinada por el Sr. Koernicke con el nombre de:" Then follows a de-

tailed description of the species, terminated by "Vive en parages arenosos húmedos de la costa platense, orillas de bañados, sobre Sphagnum. Barra de Santa Lucía, Bañados de Carrasco, Pan de Azúcar. Florece en diciembre y fructifica en enero y febrero." An unnumbered specimen of Arechavaleta's collection, labeled merely "Carrasco", was photographed by Macbride in the Delessert Herbarium at Geneva as his type photograph number 25163, but probably is actually only a topotype.

LEIOTHRIX ARETIOIDES Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41, nom. nud. 1930.

Additional bibliography: Moldenke, Phytologia 20: 88. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 944. 1971.

LEIOTHRIX ARGENTEA Alv. Silv., Fl. Mont. 1: 296. 1928.

Additional bibliography: Moldenke, Phytologia 20: 88—89. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 944. 1971.

LEIOTHRIX ARGYRODERMA Ruhl. in Engl., Pflanzenreich 13 (4-30): 227. 1903.

Additional bibliography: Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Phytologia 20: 89. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 548 & 944. 1971.

The type collection of this species, Ule 3769, is from the Serra do Itatiaia, Minas Gerais, Brazil, collected on December 27, 1895 — not from Santa Catarina as was erroneously stated by me in Phytologia 20: 89 (1970). The introductory volume of the "Flora Brasiliensis" confirms that Ule was in the Serra do Itatiaia on the stated date. I am grateful to Dr. L. B. Smith for pointing out this fact to me.

The Eitens have found this plant growing at 2500 meters altitude in open marshy thin humus layer over a sloping rock face on a plateau of steep hilly terrain, many hills topped by mountainous quartz rocks and boulders, and a thin black almost pure humus soil supporting a periodically-burned natural tussock sedge-grassland with scattered low Chusquea bamboo and occasionally other shrubs; the lower valley sides often with dense Chusquea brakes, or brooks lined with a marsh of Cladium in tussocks or with "trunks" of massed rhizomes.

Emended citations: BRAZIL: Minas Gerais: Ule 3769 [Macbride photos 10666] (B—type, B—isotype, N—photo of isotype, N—photo of isotype, W—photo of isotype, Z—isotype). Rio de Janeiro: Eiten & Eiten 6606(Ws), 6608 (Rf); Strang 782 [A. Castellanos 25777; Herb. Brad. 49653] (Rf).

LEIOTHRIX ARGYRODERMA var. BREVIPES Moldenke, Phytologia 8: 162. 1962.

Additional bibliography: Moldenke, Phytologia 20: 89. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 944. 1971.

LEIOTHRIX ARRECTA Ruhl. in Engl., Pflanzenreich 13 (4-30): 235—

236. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 89—90, 103, 110, & 261. 1970; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 944. 1971.

*LEIOTHRIX ARRECTA* var. *SENAEANA* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 236. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 90. 1970; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 944. 1971.

*LEIOTHRIX BARREIRENSIS* Alv. Silv., *Fl. Mont.* 1: 283—284. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 90, 94, & 113. 1970; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 944. 1971.

*LEIOTHRIX BECKII* (Szysz.) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 226. 1903.

Additional & emended bibliography: Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 296—298, fig. 12 B 14—21. 1908; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 162, 170, 173, & 189. 1969; Moldenke, *Phytologia* 20: 248 & 251. 1970; Moldenke, *Biol. Abstr.* 52: 719. 1971; Hocking, *Excerpt. Bot. A.19*: 43. 1971; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 547, 569, 578, 584, & 944. 1971.

Recent collectors have found this plant in flower and fruit in July and December.

Additional citations: BRAZIL: Rio de Janeiro: Strang 813 [A. Castellanos 26103; Herb. Brad. 49651] (Ac), 836 [A. Castellanos 26126; Herb. Brad. 49650] (Rf).

*LEIOTHRIX BECKII* var. *FALCIFOLIA* Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 296—298, fig. 12 B 14—21. 1908.

Additional & emended bibliography: Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 296—298, fig. 12 B 14—21. 1908; Moldenke, *Phytologia* 20: 91. 1970; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 547 & 944. 1971.

Emended illustrations: Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 296, fig. 12 B 14—21. 1908.

*LEIOTHRIX CELIAE* Moldenke, *Mem. N. Y. Bot. Gard.* 9: 278—279. 1957.

Additional bibliography: Moldenke, *Phytologia* 20: 91—92. 1970; Moldenke, *Fifth Summ.* 1: 124 (1971) and 2: 944. 1971.

*LEIOTHRIX CRASSIFOLIA* (Bong.) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 228. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 190. 1969; Moldenke, *Phytologia* 20: 248. 1970; Moldenke, *Fifth Summ.* 1: 153 & 479 (1971) and 2: 497, 580, & 944. 1971.

Additional citations: BRAZIL: Minas Gerais: Hatschbach, Smith, & Ayensu 28777 (Rf).

*LEIOTHRIX CURVIFOLIA* (Bong.) Ruhl. in Engl., *Pflanzenreich* 13 (4-

30): 233. 1903.

Additional bibliography: Beauverd, Bull. Herb. Boiss., sér. 2, 8: 298—299. 1908; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 149, 161—163, 174, 184—189, & 191. 1969; Moldenke, Phytologia 20: 248. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 497, 508, 547, 579, 580, & 944. 1971.

Irwin and his associates describe this species as a tufted herb, the flower-heads light-gray, the plant growing on campos in areas of campo, cerrado on outcrops, and wooded valleys, flowering and fruiting in March.

Additional citations: BRAZIL: Minas Gerais: Irwin, Fonseca, Souza, Reis dos Santos, & Ramos 28221 (N, Z); Irwin, Reis dos Santos, Souza, & Fonseca 22230 (N).

LEIOTHRIX CURVIFOLIA var. GLABRESCENS Ruhl. in Engl., Pflanzenreich 13 (4-30): 233. 1903.

Additional bibliography: Moldenke, Phytologia 20: 94 & 95. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 496, 580, & 944. 1971.

Additional citations: BRAZIL: Minas Gerais: Hatschbach, Smith, & Ayensu 28792 (Rf).

LEIOTHRIX CURVIFOLIA var. LANUGINOSA (Bong.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 234. 1903.

Additional bibliography: Moldenke, Phytologia 20: 248 & 355. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 504, 547, 585, & 944. 1971.

LEIOTHRIX CURVIFOLIA var. MICROPHYLLA Alv. Silv., Fl. Mont. 1: 296. 1928.

Additional bibliography: Moldenke, Phytologia 20: 95 & 97. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 944. 1971.

The Eitens found this plant growing in fine sandy soil, at 1150 meters altitude, in fields with outcroppings of itacolomite quartzite slabs, flowering in November.

Additional citations: BRAZIL: Minas Gerais: Eiten & Eiten 6851 (Rf).

LEIOTHRIX CURVIFOLIA var. PLANTAGO (Mart.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 234. 1903.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 426—427 & 507. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 234, 288, & 291. 1903; Moldenke, Phytologia 20: 94, 95, & 97—99. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 588 & 944. 1971.

Hatschbach found this plant growing in rocky and wet sandy campos, at 1200 meters altitude, flowering and fruiting in September.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27354 (N, Rf); Hatschbach, Smith, & Ayensu 28797 (Rf).

*LEIOTHRIX CURVIFOLIA* var. *PROLIFICA* Ruhl. in Engl., Pflanzenreich 13 (4-30): 234. 1903.

Additional bibliography: Moldenke, Phytologia 20: 98. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 945. 1971.

*LEIOTHRIX CURVIFOLIA* var. *SETACEA* Ruhl. in Engl., Pflanzenreich 13 (4-30): 234. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969; Moldenke, Phytologia 20: 94 & 98-99. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 547 & 945. 1971.

Recent collectors have found this plant growing on rocky or sandy campos, at 1100 meters altitude, flowering and fruiting in January.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27430 (Rf); Hatschbach, Smith, & Ayensu 28962 (Rf).

*LEIOTHRIX CURVIFOLIA* var. *SUBGLAUDESCENS* Ruhl. in Engl., Pflanzenreich 13 (4-30): 233-234. 1903.

Additional bibliography: Moldenke, Phytologia 20: 99-100. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 945. 1971.

*LEIOTHRIX CUSCUTOIDES* Alv. Silv., Fl. Serr. Min. 71, pl. 27. 1908.

Additional bibliography: Moldenke, Phytologia 20: 100. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 945. 1971.

Additional citations: BRAZIL: Minas Gerais: Hatschbach, Smith, & Ayensu 28822 (Rf).

*LEIOTHRIX DIELSII* Ruhl. in Engl., Pflanzenreich 13 (4-30): 231-232. 1903.

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*LEIOTHRIX DISTICHOCLADA* Herzog ex Luetzelburg, Estad. Bot. Nordeste. 3: 147 & 150, hyponym (1923), and in Fedde, Repert. Spec. Nov. 20: 88. 1924.

Additional bibliography: Moldenke, Phytologia 20: 101-102. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 945. 1971.

*LEIOTHRIX DISTICHOCLADA* f. *BRACTEOSA* Herzog ex Luetzelburg, Estud. Bot. Nordeste. 3: 147 & 150 (as "*f. bracteata*"), hyponym (1923) and in Fedde, Repert. Spec. Nov. 20: 88. 1924.

Additional bibliography: Moldenke, Phytologia 20: 101 & 102. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 547 & 945. 1971.

*LEIOTHRIX DISTICHOCLADA* var. *GLANDULOSA* Herzog in Fedde, Repert. Spec. Nov. 20: 88. 1924.

Additional bibliography: Moldenke, Phytologia 20: 102. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 547 & 945. 1971.

[to be continued]

## BOOK REVIEWS

Alma L. Moldenke

"PHOTOSYNTHESIS AND PHOTORESPIRATION" edited by M. D. Hatch, C. B. Osmond & R. O. Slatyer, x & 565 pp., illus., Wiley - Interscience, a division of John Wiley & Sons, Inc., London, Sydney, Toronto and New York, N. Y. 10016. 1971. \$19.00.

Here are the proceedings of a conference on these processes sponsored by both the Australian Academy of Sciences and our National Science Foundation near the end of 1970 in Canberra. There are 62 papers grouped under the following sections: (1) environment, adaptation, and evolution in relation to photosynthetic and photorespiratory gas exchange, (2) carbon dioxide assimilation, (3) chloroplast structure and function, (4) photorespiration and the role of microbodies.

The relatively recent discovery and interpretation of the  $C_4$  dicarboxylic acid pathway in photosynthesis is interesting of itself and may possibly lead to some practical application since such plants have a greater photosynthetic capacity. This  $C_4$  pathway is found more commonly in tropical plants, in some Poaceae, Cyperaceae, Amaranthaceae, Chenopodiaceae, Portulacaceae, Euphorbiaceae, Nyctaginaceae, Aizoaceae, Asteraceae and Zygophyllaceae with some of the same genera having both  $C_3$  and  $C_4$  pathways. A check-list of 119 known  $C_4$  plants is given.

According to Osmond's assessment "the light reactions of photorespiration are probably restricted to the synthesis of glycolate, concomitant with Calvin cycle metabolism." In the dark energy-consuming reactions much "glycolate carbon is converted to glycine in the peroxisome."

According to Beaver's assessment photorespiration "is an  $O_2$ -consuming and  $CO_2$ -yielding sequence which depends on light only for the supply of its substrate, glycolate."

On page 453 accommodate is misspelled.

Much new and stimulating information and ideas are presented here to the interest of many kinds of biologists and chemists and their students.

"WATER — The Wonder of Life" by Rutherford Platt, xi & 274 pp., illus., Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632. 1971. \$8.95.

Readers of this author's previous works have these experiences as all they need to invite them to relish reading this one. In his stimulating and pleasantly analytical style he looks over, under, around, inside, through and beyond facts and ideas.

He discusses this wonderful water in terms of its ions, atoms, molecules and biochemical components, its role on earth and in all

life forms and functions, its power and beauty, its destruction by pollution, and man's recent arousal to this danger. Because of his special concern about thermal pollution, he urges holding in abeyance further atomic plant construction until further studies are made. In the interim he urges use of conventional fuels and the further development of the less destructive magneto-hydrodynamic plants.

A couple of minor items should have been checked: additions of the words carbon on p. 59 and rather on p. 80, misspellings of seminal on p. 139, entomologist on p. 180 and indicators on p. 244, and substitution of Vertebrata for Chordata on p. 85.

Interestingly annotated bibliography is given throughout the text in footnote form.

"LIVING ON THE THIRD PLANET" by Hannes & Kerstin Alfvén, translated by Eric Johnson, viii & 187 pp., W. H. Freeman & Co., San Francisco, California 94104. 1972. \$4.95.

This little book first published in Stockholm in 1969 as "M70" offers much to think about with many questions asked and only some answered because many are still unanswerable. In it the authors analyze our remarkable form of life that has evolved on this third and unique planet Earth in our solar system. Humanity is mastering atomic and cosmic forces and is using cynerbetic information on one hand and yet on the other still has more illiteracy, increasing pollution, dangerous population explosion, defective political leadership, and an alarming stockpile of nuclear weapons.

The authors consider the possibilities of intelligent life in other galaxies and man's possible hope of reaching such by laser, etc., communication and by visit as escape (but with no consideration of the energy problem involved). They stress the need for study groups from all disciplines and crossing national boundaries.

"INCIDENTS OF TRAVEL IN CENTRAL AMERICA, CHIAPAS AND YUCATAN", Volumes I & II, by John L. Stephens. Volume I: vi & 424 pp., illus. Volume II: 474 pp., illus., replication printing by Dover Publications, Inc., New York, N. Y. 10014. 1969. \$3.00 each volume, paper-bound.

This is an unabridged replication of the original 1841 edition with a few additions from the 1854 issue. The writing style makes for interesting reading, but does little with natural history and much of fine quality with the archaeological features of the area, as, for instance, at Palenque. There are many excellent drawings of historic artifacts by Frederick Catherwood.

"FOURTH EUROPEAN MARINE BIOLOGY SYMPOSIUM" edited by D. J. Crisp, viii & 599 pp. & plates unpagged, Cambridge University Press, London NW1 2DB & New York, N. Y. 10022. 1971 [1972]. \$39.50.

This is the fourth of this series of symposia and it was held in 1969 by invitation of the Marine Science Laboratories of the University of North Wales. Its themes were larval biology with 23 papers on field observations, experiments on behavior and distribution, development and fine structure, and light in the marine environment with 18 papers on measurement of illumination and its submarine influence, responses of marine animals to light, etc.

There is an index for subject matter and one for authors. Bibliographic material is given with each paper. There are excellent illustrations. This book presents much valuable new scientific information and therefore is of high value academically -- but \$39.50 is an amazing price for it!

"FIRST SYMPOSIUM ON RECENT AND FOSSIL MARINE DIATOMS" edited by Reimer Simonsen, viii & 294 pp. & unnumbered plates. Verlag J. Cramer, 3301 Lehre, Germany. 1972.

Here are 15 of the 22 papers presented at the Institut für Meeresforschung (with its famous Hustedt diatom collection) in Bremehaven in 1950 and published as Beihefte zur Nova Hedwigia Heft 39. The papers are mostly taxonomic in reference to both fossil and living specimens. Others are ecological or procedural in reference to microscopical study of diatomaceous sediments. Many are well illustrated with special mention going to Hasle's "Two Types of Valve Processes in Centric Diatoms". The work is not indexed.

"THE MALAY ARCHIPELAGO — The Land of the Orang-utan and the Bird of Paradise — A Narrative of Travel with Studies of Man and Nature" by Alfred Russel Wallace, xvii & 515 pp., illus., facsimile republication, Dover Publications, Inc., New York, N. Y. 10014. 1962. \$3.00, paper-back.

This is an unabridged copy of the last revised edition of this famous work dated 1869. It certainly is advantageous to have many copies available again and at so reasonable a price. It is hoped that our intelligent, biologically inclined young people can be induced to read it and thereby learn more of this stage in the development of natural science.

"DORMANCY AND SURVIVAL" edited by H. W. Woolhouse, viii & 598 pp., illus., Academic Press, Inc., New York, N. Y. 10003. 1969. \$15.00.

Here are 22 particularly interesting papers from the 23rd sym-

posium of the Society for Experimental Biology held at the University of East Anglia in 1968. They deal with the many mechanisms for survival through extreme conditions as shown by several different organisms — sporulating bacteria and fungi, encysting amoebae and nematodes, stem and tuber buds, diapausing insects, hibernating and aestivating poikilotherms and homeotherms. Biochemically these quiescent stages have often been associated with cessation of DNA, RNA, enzyme and protein synthesis on the cellular level and loss of oxidation in perpetuating seed dormancy on a grosser level. Dormancy in higher plants of the deserts and of the tropical forests (where they do not grow continuously) is described for buds and seeds.

This work is provided with detailed author and subject indexes.

"GROWTH AND DEVELOPMENT OF TREES" by T. T. Kozlowski, Academic Press, Publishers, New York, N. Y. 10003. 1971. Volume I: "Seed Germination, Ontogeny, and Shoot Growth", xiii & 443 pp., illus. \$23.00. Volume II: "Cambial Growth, Root Growth, and Reproductive Growth", xv & 514 pp., illus. \$29.00.

It is sincerely hoped that this publication has not been priced beyond the market for forestry students because it is surely the best available for directing academically their learning in this field. Those already professionally in this field and others of related interests should be able to gain much from having so much material so well organized in these two volumes. Each is very well illustrated, has its own full bibliography and indexes of authors and subjects. It is to be regretted that in the latter no scientific names are included.

Important is misspelled on p. xi in Volume I but not in Volume II.

"PLANT COMMUNITIES: A Textbook of Plant Synecology" by Rexford Daubenmire, xi & 300 pp., illus., Harper & Row, Publishers, London, Evanston, Illinois & New York, N. Y. 10016. 1968. \$9.75.

The author's earlier "Plants and Environment" was autoecological in approach, while this one centers on communities as components of ecosystems in reference to their origins, developments, and maintenance. It builds and explains its new terminology of classification throughout the text.

By well chosen photographs and carefully explicative text the author considers (1) the nature of plant communities including the association concept as a type of climax phytocoenosis, (2) analysis and description of plant communities, including sampling and other quantitative techniques, (3) plant succession, (4) vegetation and ecosystem classification including a landscape hierarchy of vegetation zone, province and region, and (5) vegetation as an

objective of study with its operational procedures and organization of synecological information. Valuable references are indicated throughout the text.

This is a fine text for teaching purposes. It tends to have its own vocabulary, but so do most other books in this field.

"PHYSICAL EDAPHOLOGY — The Physics of Irrigated and Nonirrigated Soils" by Sterling A. Taylor & Gaylen L. Ashcroft, xiii & 533 pp., illus., W. H. Freeman & Co., San Francisco, California 94104. 1972. \$17.50.

This excellent text represents the life work of the senior deceased author and that of his long-time colleague at Utah State University. Its advantages over most of the other books in the field are its modern ecological orientation, its clear exposition of principles, its effective application of them to modern scientific practices, its copious apt illustrations, its choice of many good references for each topic, and its appendices with all necessary tables and insignia. It will prove valuable to students and workers in many fields connected with soils and plant growth.

For the foundations of irrigation science it discusses the following topics: climate factors, evapotranspiration, physical properties of water, the colloidal system, soil solids, energy relations and movement and measurement of soil water, water retention and flow in field soil, soil structure and aeration, temperature, irrigation methodology for maximum production and under adverse conditions.

"HOW TO KNOW THE WEEDS" 2nd edition by R. E. Wilkinson & H. E. Jaques, vii & 232 pp., illus., William C. Brown Co., Dubuque, Iowa 52001. 1972. \$3.75 spiral-bound paper-back.

This considerably revised new edition in this pictured-key nature series will probably prove as pleasant and useful a field and garden companion for the general reader as the first edition of 1959 by Jaques alone. Geographic distribution maps are supplied for some species.

Information on the nature and structure of weeds and their control are given. It would have been ever so helpful if the illustrations had a little "1/4 X" or whatever to indicate true size as well as mere form. This book lends itself for schoolroom for simple classes or younger students.

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A NEW COMBINATION IN *LAMOUROUXIA*  
(SCROPHULARIACEAE)

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and

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&

William J. Hess

Newark State College, Union, New Jersey 07083

In a recent revision of the genus *Lamourouxia* (Scrophulariaceae), Ernst (1972) included *L. hyssopifolia* A. Gray in synonymy under *L. longiflora* Benth. He commented "Whether *L. hyssopifolia* is conspecific is debatable as it is known from a distant locality in Chihuahua where the dimensions of the leaves and corolla are smaller and a few of the leaves are provided with one or two conspicuous teeth." He added later "If one had only a single specimen of the Hartweg collection [the type of *L. longiflora*] and only one collection of *L. hyssopifolia*, it would seem indisputable that two distinct species were represented. When all of the specimens are viewed at one time, the range of variation is apparent and suggests that one species is a better gamble until shown otherwise by biosystematic information." While we can not add any additional "biosystematic information" to the overall problem, we can report the discovery of *L. hyssopifolia* in a new location, and suggest that Ernst is correct in placing the two extremes in the same species. However, it is obvious that these entities may be readily distinguished and placed in a lower taxonomic rank.

The leaves of *Lamourouxia longiflora* are generally longer and narrower than those of *L. hyssopifolia*. In the first they range from about (25) 30-55 mm in length while those of the second are merely 10-30 (35) mm long. The width of the widest leaves in the first entity rarely exceed 6 mm, but in the other they may be up to 10 mm wide. Ernst was puzzled by the toothed leaves he noted on some specimens (but not all) of the two collections of *L. hyssopifolia* he had at hand. Our studies show that while this is a variable character from one stem to another on the same plant, it is a typical feature of the plant. We found that all plants had toothed leaves, but when herbarium specimens were prepared, often the lowermost stems are broken off (where toothed leaves are most common), or the stem was not as fully mature as others and toothed leaves were not yet present.

The flowers of our material were 35-50 mm in length and extend those measurements that Ernst had found for the specimens of *L. hyssopifolia* that he examined. The corollas of his material for

this taxon ranged in length from 26-42 mm, whereas the corollas of *L. longiflora* varied from 40-55 mm. Thus, one of the features considered by Gray (1886) and Ernst (1972) to distinguish the two species does not hold.

Two characters overlooked by Ernst are the length and condition of the lobes of the calyx. Those of *Lamourouxia longiflora* vary from 6-13 mm in length and are flattened, while the revolute lobes of *L. hyssopifolia* do not exceed 5 mm. These seemingly minor differences are consistent and may be used to distinguish the two entities.

While we have not seen all of the material of the two species available to Ernst (a total of six collections with 15 duplicates), we have been able to observe those specimens deposited at MO, NY and US. Our own collection of 30 sheets will, in fact, double the number of specimens available. From these specimens, we can conclude that the two species can not be maintained at that rank, but may be segregated into two variants which may be distinguished on three consistent morphological features. The new combination is:

*Lamourouxia longiflora* Benth. var. *hyssopifolia* (A. Gray) Reveal & Hess, comb. et stat. nov., based on *L. hyssopifolia* A. Gray, Proc. Amer. Acad. Arts 21:404. 1886.

SPECIMENS EXAMINED: Chihuahua: Near Batopilas, Oct 1898, *Goldman* 210 (NY, US); At the Frailes in the mountains above Batopilas, Aug-Sep 1885, *Palmer* 260 (NY, US - the type collection). Durango: 20.6 miles west of Ojito on road to El Vergel west of Hildalgo del Parral, 14 Sep 1972, *Reveal & Hess* 3086 (US, plus 29 duplicates).

The var. *hyssopifolia* may be distinguished from var. *longiflora* by its shorter revolute calyx lobes (2-5 vs. 6-13 mm long), slightly shorter and broader leaves which are often 1-4 toothed, and more northern distribution. The typical variety is known only from Jalisco and central Durango, while var. *hyssopifolia* is known from only two locations, one in southwest Chihuahua and a second in extreme northern Durango.

Field work in Mexico was supported by National Science Foundation Grant GB-22645 to the senior author for studies on the genus *Eriogonum* (Polygonaceae) and the Intermountain Flora.

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ADDITIONS TO THE MOSS FLORA OF VENEZUELA  
FROM THE STATE OF MÉRIDA

Dana Griffin, III  
Bryophyte and Lichen Herbarium  
University of Florida

and

Manuel López Figueiras and Luis Ruiz-Terán  
Departemento de Botánica y Farmacognosía  
Mérida, Venezuela

During July and August of 1972 the authors made a collection of bryophytes from the states of Mérida and Táchira with the view to providing as complete a picture as possible of the floristic diversity of this area. The primary collection contains some 2,500 packets, duplicates of which have been deposited in the herbaria of the University of Florida and the Universidad de los Andes.

A cursory examination of this material has turned up a number of records for the country which are reported at this time along with pertinent notes. A complete list of the species collected will be forthcoming.

To explain the comparative richness of the flora of Mérida, both vascular and nonvascular, consideration must be given to the topography of the state. Beyond the fact that the area lies within tropical latitudes is the additional fact that its topography is exceedingly varied. A diverse mosaic of elevations, exposures and climates provides an ecological background in which a great number of species can and do survive. A simplified vegetational map for the state (Fig. 1) recognizes 4 main zones, yet this hardly begins to account for the numerous subzonal associations and communities that occur. The study by Ewel, Madríz and Tosi (1968) provides a basic picture of the complex physiography of this part of Venezuela.

Mérida is the principal city in the state of the same name. Where in the following notes distance from Mérida is given, it is in reference to the city not the state.

Polytrichadelphus aristatus (Hampe) Mitt.

MÉRIDA: Sierra Nevada de Mérida, along path of the Teleférico between La Aguada and La Montaña, inorganic soil bank, 2880 m, 417.

An Andean species, as are most for the genus, P. aristatus has been reported previously from Bolivia to Colombia (Bartram, 1953; Robinson, 1967)

Tristichium mirabile (C. Müll.) Herz.

MÉRIDA: Sierra Nevada de Santo Domingo, Páramo de Mucubajf, above the Laguna Grande, on humid soil bank under shrubs, 3500 m, 996; on soil in protected rock cavities, 3500 m, 1040.

This distinctive taxon, cited from Argentina and Bolivia by Brotherus (1924), later had its range extended to Colombia by Robinson (l.c.) and to Costa Rica by Bowers (1970). Its occurrence in Venezuela is entirely expected.

Streptopogon cavifolius Mitt.

MÉRIDA: In abandoned coffee plantation on road from Mérida to La Azulita, on branches of Coffea arabica, 1800 m, 162, 203; along Panamerican Highway in the city of Mérida, on trunk of Salix chilensis, 1600 m, 646.

The broadly obtuse, cucullate leaf tips render this species unmistakable. The previous range included Ecuador, Colombia and México (Salmon, 1903)

Streptopogon lindigii Hampe

MÉRIDA: El Valle road 12 kms. n.w. of Mérida, Quebrada de la Caña, on branches of tree along small ravine, 2400 m, 18.

This species is easily identified by the long aristate, unbordered leaves. Its previous range was restricted to Colombia (Salmon, l.c.).

Tayloria scabriseta (Hook.) Mitt.

MÉRIDA: Sierra Nevada de Mérida, along the path of the the Teleférico between La Aguada and La Montaña, in cloud forest on humus, 2900 m, 411.

Known previously from Colombia and Ecuador (Mitten, 1869) and Costa Rica (Bowers, l.c.)

Conostomum pentastichum (Brid.) Lindb.

MÉRIDA: Sierra Nevada de Mérida, track of the Teleférico, Loma Redonda station near the Laguna de los Anteosojos, páramo, on wet soil, 3800 m, 376, 492; Sierra de Santo Domingo, Páramo de Mucubajf, below the Laguna de los Patos, on wet rock cliff, 3700 m, 1374.

Thought to be an austral species, but recently cited from Central and Northern Latin America (Bowers, l.c.)

Hedwigidium imberbe (Sm.) B.S.G.

MÉRIDA: Sierra Nevada de Mérida, track of the Teleférico, Loma Redonda station, páramo, on rock, 3800 m, 373; along the path of the Teleférico between La Aguada and La Montaña, on rock, 3350 m, 209, 232; Sierra Nevada de Santo Domingo, Páramo de Mucubají, above the Laguna Grande, on humic soil, 3500 m, 854, on dry igneous rock, 3390 m, 890, 3500 m, 866, 1068, 1153, 1201; slope of the Laguna Negra, on moist igneous rock, 3350 m, 1156; Páramo de la Negra, on igneous rock, 2900 m, 2061, 3000 m, 2096, 2116.

A cosmopolitan and polymorphic species with a altitudinal-latitude gradient (Griffin, in press); in the tropics restricted to the higher elevations and almost invariably collected from igneous rocks.

Cryphaea reticulata Besch.

MÉRIDA: El Valle road 12 kms. n.w. of Mérida, Quebrada de la Caña, on tree trunk, 2400 m, 23; El Maciegal, valley of the La Pedregosa stream, tributary of the Chama river, in residual cloud forest on tree trunk, 1900 m, 705; along road from Mérida to La Azulita near los Zíneros, on fallen branches, 2000 m, 1429.

Known previously from México and Guatemala (Bartram, 1949).

In our collection as well is a specimen of Cryphaea filiformis (Hedw.) Brid. with the following collection data: MERIDA: Páramo de la Negra, on branches, 2900 m, 2075. While representing a state record, there is some doubt that it is new for the country. Pittier (1936) makes reference to an Acrocryphaea filiformis Brid. from the Federal District. This combination is invalid, and we assume that his plants are the same as ours.

Porotrichodendron robustum Broth.

MÉRIDA: La Carbonera between Mérida and La Azulita on the San Eusebio farm, epiphyte in cloud forest, 2300 m, 1531, 2350 m, 1726.

Previous range; Bolivia (Herzog, 1916), Colombia (Robinson, l.c.).

Homalothecium leskeoides (Hook.) Robins.

MÉRIDA: La Chorrera, between Mérida and La Azulita, on boulders along forest stream, 1800 m, 61.

Previous range; Southern United States to South America.

Aptychella americana (Card.) Broth.

MÉRIDA: Sierra Nevada de Mérida, track of the Teleférico between La Aguada and La Montaña, epiphyte, 3150 m, 229; Sierra Nevada de Santo Domingo, Páramo de Mucubají, on branches of a ligneous Senecio, 3390 m, 1233, on trunk of Espeletia humbertii, 3400 m, 1231, epiphyte, 3400 m, 1238, 1239, 1244.

Previous range; México, West Indies, Colombia and Bolivia (?) . . see Bowers (l.c.) and Robinson (l.c.).

Aptychella proligera (Broth.) Herz.

MÉRIDA: Sierra Nevada de Mérida, track of the Teleférico between La Aguada and La Montaña, on branches of ericaceous shrub, 3260 m, 436; Sierra Nevada de Santo Domingo, below Laguna Negra, on trunk of Polylepis sericea, 3550 m, 958, 961, on branches of a shrubby Berberis, 3390 m, 1247; La Carbonera between Mérida and La Azulita on the San Eusebio farm, fallen trunk, 2300 m, 1484.

Stereodon hamatus Mitt.

MÉRIDA: Páramo de la Negra, on trunk and branches of trees, 2900 m, 1966, 1992.

Previous range; Ecuador (Steere, 1948), Colombia (Robinson, l.c.) and Costa Rica (Bowers, l.c.). This name is applied to a rather polymorphic complex. Our own plants differ from typical S. hamatus in seta length (1.6 - 2 cm.) and in spore size (27-30 u).

Hypnum mirabile Bartr.

MÉRIDA: Páramo de la Negra, over thin soil covering igneous rocks, 3000 m, 2101, 2112.

Unmistakable by its nonplicate, abruptly acuminate leaves with conspicuously incrassate alar cells.

Previous range limited to México (Crum, 1951) and Guatemala (Bartram, 1949).

Ctenidiadelphus cylindricarpus (Card.) Bartr.

MÉRIDA; Sierra Nevada de Mérida, track of the Teleférico between La Aguada and La Montaña, on soil-humus, 2940 m, 415.

Previous range; México to Costa Rica (Bowers, l.c.)

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## STATE OF MÉRIDA, VENEZUELA

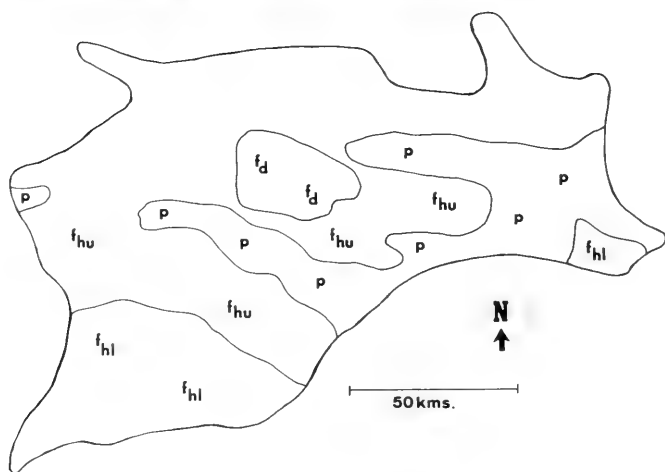


Fig. 1. Generalized vegetational map of the state of Mérida. P = páramo, F<sub>d</sub> = semi-arid deciduous forests and arid forests, F<sub>hl</sub> = deciduous forests and rain forests, F<sub>hu</sub> = upland deciduous forests and rain forests.

STUDIES IN AMERICAN PLANTS, V.

Dorothy N. Gibson  
Field Museum of Natural History

ACANTHACEAE

Recent examination of a collection of Ruellia from Honduras, made at the request of Prof. Antonio Molina R. of the Escuela Agrícola Panamericana, revealed the following new species:

RUELLIA MOLINAE D. Gibson, sp. nov.

Herbae erectae, suffruticosae, 15-50 cm. altae; folia opposita, petioli 0.5-2.5 cm. longis, laminae lanceolatae vel ovatae, 3-7 cm. longae, acuminatae, basi acutae vel rotundatae, glabratae vel minute adpresso-pubescentes in costis et venis, integrae vel haud manifeste crenatae sed ciliatae; inflorescentiae subumbelliformes, pedunculatae, pedunculis 3-7 cm. longis, 2-6 flores sessiles vel subsessiles; bracteis foliiformibus, 1-2 cm. longis; calyx 4-8 mm. longus, lobiis 5, lineari-subulatis; corolla rubra, 2.5-3 cm. longa; stamina 4; capsula immatura clavata, pubescente; semina 8 vel numerosiora, lenticformia.

Erect, suffruticose plants, 15-50 cm. tall, the stems bifariously pubescent or glabrate, simple or sparsely branched; leaves on petioles 0.5-2.5 cm. long, the blades lanceolate or the lower ones sometimes ovate, acuminate, acute or almost rounded at the base, mostly 3-7 cm. long, glabrous or minutely appressed-pubescent along the costae and veins, the margins entire or obscurely crenate but ciliate, the cystoliths numerous and conspicuous; inflorescences axillary, sub-umbelliform, long-pedunculate, the peduncles 3-7 cm. long, pubescent or glabrate, the 2-6 flowers sessile or subsessile, the bracts leaf-like, 1-2 cm. long, 0.3-0.5 cm. broad; bracteoles linear, acuminate, 3-6 mm. long, pubescent; calyx 4-8 mm. long, the 5 segments linear-subulate, essentially glabrous but sparsely ciliate; corolla red, glabrous outside or minutely puberulent on the lower portion, 2.5-3 cm. long, the narrow basal portion of the tube about 0.5 cm. long, the throat rather abruptly dilated, then ampliate to about 5 mm. wide below the lobes, the limb spreading, the lobes mostly less than 1 cm. long; stamens 4, bithecal; immature capsule about 8 mm. long, clavate, pubescent, containing 8 or more flat, lenticular seeds.

HONDURAS: Dept. Olancho, Matorrales húmedos de Quebrada Catacamas cerca de la presa en Montaña Peña Blanca, 900 m., Molina 8343, type (F) (EAP).

Apparently related to R. pereducta Standley and R. stemonacanthoides (Oerst.) Hemsley, both with larger leaves, mostly 7-15 cm. long, and longer corollas, 3-4.5 cm. long.

## CAPRIFOLIACEAE

As a result of recent studies of the genus Viburnum during preparation of manuscript for the Caprifoliaceae in the "Flora of Guatemala", one new species from Chiapas, Mexico has been distinguished, new combinations for two Guatemalan species are required, and as it was decided to exclude from the Flora another Chiapas species because the inadequate material prevented naming it with certainty, it seems appropriate to discuss it here.

I wish to thank the curators of the U. S. National Herbarium, the New York Botanical Garden, and the Harvard University Herbaria for their cooperation in lending essential specimens.

The work for this paper and preparation of the manuscript for the Flora of Guatemala has been carried on with assistance of continuing grants GB27385 and GB32190 from the National Science Foundation to Dr. Louis O. Williams, principal investigator.

VIBURNUM DISJUNCTUM var. MENDAX (Morton) D. Gibson, comb. nov.  
V. mendax Morton, Proc. Biol. Soc. Wash. 49: 154. 1936.

Differs from V. disjunctum Morton only in having considerably less indument, the leaves usually rather sparsely stellate-pubescent beneath or glabrate, and the calyx tube often appearing green and somewhat viscid due to lack of indument. The calyx tube of V. disjunctum is densely tomentose.

VIBURNUM JUCUNDUM var. DETRACTUM (Standl. & Steyerl.) D. Gibson, comb. nov. V. detractum Standl. & Steyerl. Field Mus. Bot. 23: 89. 1944.

Differs from V. jucundum only in amount of indument, the stems and branches sparsely pilose rather than tomentose, and the tissue between the veins of the leaves is almost glabrous.

VIBURNUM OBTUSATUM D. Gibson, sp. nov.

Frutices vel arbores debiles usque ad 6 m. altae; folia opposita, petiolis brevibus, laminae 2-6 cm. longae, ovatae vel lanceolatae, breviter acuminatae sed obtusatae, basi rotundatae aut acutae, plerumque abrupte decurrentes in petiolis, integrae, glabratae; inflorescentiae pedunculatae, pedunculis puberulis, 1-3 cm. longis; cymae bi-compositae, 1.5-3 cm. latae, 5-7 radiis primariis puberulis, interdum plus minusve rubro-glandulosi; pedicelli saepe rubro-glandulosi; calyx lobis ca. 1 mm. longis, late triangularibus, obtusis aut acutis, glabris; corolla alba, glabra, ca. 5 mm. diametro; stylus glabris aut basi plus minusve pubescens; fructus purpureus, obovoideus, 1 centimetro brevior, putamen sulcatum.

Shrubs or weak trees to 6 m. tall; leaves opposite, petioles short, the blades 2-6 cm. long, ovate or lanceolate, obtusely short-acuminate at the apex, rounded or acute at the base and usually abruptly decurrent on the petiole, entire, essentially glabrous; inflorescences pedunculate, the peduncles finely puberulent, 1-3 cm. long; cymes twice compound, 1.5-3 cm. broad, the 5-7 primary rays minutely puberulent, sometimes more or less red-glandular; pedicels frequently red-glandular; calyx lobes about 1 mm. long, broadly triangular, obtuse or acute, glabrous; corolla white, glabrous, about 5 mm. in diameter; style glabrous or somewhat pubescent near the base; fruits purple, obovoid, less than 1 cm. long, the stone grooved.

MEXICO: Steep slopes with Quercus, on northeast slope of Zontehuitz near summit, and on road from San Cristobal las Casas to Tenejapa, Chiapas, 8,300-9,300 feet, Breedlove and Raven 8118, type (flowering) (F); Breedlove 9077 (fruiting) (F).

In addition to the 13 species of Viburnum treated in the forthcoming volume of the Flora, there is another in Chiapas, represented by two collections, A. J. Sharp 45988, elev. 7,100 ft., and R. M. Laughlin 943, elev. 4,500 ft., both annotated by Morton as V. mendax Morton (V. disjunctum var. mendax D. Gibson). However, the leaves of the var. mendax are lance-ovate to lance-oblong, mostly 7-20 cm. long, acuminate to long-acuminate at the apex, with indument of the lower surfaces composed of minute stellae less than 0.5 mm. in diameter; the leaves of the Chiapas plants are broadly ovate to oblong-oval, mostly 2.5-7.5 cm. long, 2-4 cm. broad, abruptly short-acuminate or apiculate, with indument composed of large stellae 1-2 mm. in diameter. Unfortunately, both Chiapas collections lack flowers. A few fruits remaining on Sharp 45988 are sparsely stellate-pubescent and the calyx lobes are ciliate. The type of indument suggests the Mexican V. loeseneri Graebn. but the leaves of that species are small, commonly 2-5 cm. long and only 1-2.5 cm. broad.

# NEW NAMES FOR NEOTROPICAL PLANTS

W. G. D'Arcy  
Missouri Botanical Garden

FICUS CITRIFOLIA Mill. var. BREVIFOLIA (Nutt.) D'Arcy, comb. nov. Ficus brevifolia Nutt., North Amer. Sylva 2: 3, t. 42. 1849. Among other distinctions this variety displays a characteristic reddish bark not usual in the typical variety.

ATHENAEA ORINOCENSIS (Kunth) D'Arcy, comb. nov. Physalis orinocensis Kunth in H. & B., Nov. Gen. 3: 12-13. 1818. Type: Venezuela, Bonpland s.n. (P).

LYCIANTHES ESCUINTLENSIS (Coult.) D'Arcy, comb. nov. Brachistus escuintlensis Coult., Bot. Gaz. 16: 144. 1891. Type: Guatemala, Donnell Smith 2267 (lectotype US; isolectotypes F, G, GH).

MARKEA MEGALANDRA (Dun.) D'Arcy, comb. nov. Metternickia megalandra Dun. in DC., Prodr. 13(1): 595. 1852. Type: Colombia, Moritz 827 (holotype G-DC; isotype BM; photo MO).

SOLANUM QUITOENSE forma SEPTENTRIONALE (Schultes & Cuatrec.) D'Arcy, stat. nov. Solanum quitoense var. septentrionale Schultes & Cuatrec., Bot. Mus. Leaflet. Harvard Univ. 16: 100. 1953. Lectotype: Colombia, Cuatrecasas 23853 (F).

WITHERINGIA DICHOTOMA (Rusby) D'Arcy, comb. nov. Cyphomandra dichotoma Rusby, Mem. Torrey Bot. Club 4: 231. 1895. Type: Bolivia, Bang 519 (K, MO, NY).

CESTRUM LEWISII D'Arcy, nom. nov. Cestrum acuminatum Francey, Candollea 6: 348-9. 1935, non C. acuminatum Sweet, Hort. Brit. ed. 2: 388. 1830. Type: Costa Rica, Standley & Valerio 52237 (F). Named in honor of Prof. Walter H. Lewis, St. Louis, Missouri, who for several years led the Missouri Botanical Garden's scientific efforts in Panama and encouraged those around him to study the Panamanian flora.

Concepts supporting most of the above names will be presented in the treatment of the Solanaceae in Woodson & Schery, Flora of Panama (Ann. Missouri Bot. Gard.) when it is issued.

SEVEN NOVELTIES FROM NORTH AND SOUTH AMERICA

Harold N. Moldenke

*LACHNOCAULON ENGLERI* var. *CAULESCENS* Moldenke, var. nov.

Haec varietas a forma typica speciei caulibus dense foliosis uniforme 2—4 cm. longis recedit.

This variety differs from the typical form of the species in having densely leafy stems uniformly elongated 2—4 cm.

The type of the variety was collected by H. Iltis, Crosswhite, Kawano, & al. (no. 21439) in open sandy areas with *Ceratiola*, *Cladonia* spp., *Kalmia hirsuta*, *Conradina*, etc., about 6 miles east of Fort Morgan on the road to Gulf Shores, Fort Morgan Peninsula (bordering Mobile Bay), Baldwin County, Alabama, on April 15, 1963, and is deposited in the herbarium of the University of Wisconsin at Madison.

*LANTANA MORITZIANA* f. *PARVIFOLIA* Moldenke, f. nov.

Haec forma a forma typica speciei foliis lanceolatis parvioribus valde recedit.

This form differs from the typical form of the species in its lanceolate and uniformly much smaller mature leaves, these being mostly with their blades only 1.5—3.5 cm. long and 1—1.8 cm. wide.

The type of the form was collected by Santiago López-Palacios (no. 2585) at Tovar, at an altitude of about 970 meters, Distrito Tovar, Mérida, Venezuela, on May 16, 1971, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector says of it: "Arbusto inerme, ca. de 2.50 m. de alto. Hojas lanceoladas de envés velutinoso, pelos glandulares entre los tectores. Corolas amarillas (las externas anaranjado-ladrillo). Cabezuelas sin involucro con brácteas pequeñas."

*STACHYTARPHETA CHAPADENSIS* Moldenke, sp. nov.

Herba ascendens, caulibus usque ad 15 cm. altis pubescentibus, pilis patentibus; foliis oppositis numerosis sessilibus oblanceolatis 1.9—3.3 cm. longis 2.5—9 mm. latis firmis ad apicem acutis usque ad basin attenuatis utrinque glabris vel subglabris nitidis, subtus dense impresso-punctatis, margine integris vel apicem versus paucodenticulatis, saepe paucobscureque ciliatis, juventute in costa media subtus paucissime pilosulis; spicis brevibus densis minute pilosulis.

Ascending herb; stems slender, to 15 cm. tall, apparently much-branched, more or less pubescent with somewhat spreading rather short but irregular hairs; principal internodes rather short and regular, 1—2.5 cm. long; leaves decussate-opposite, sessile, numerous, ascending, firmly chartaceous, rather stiff, oblanceolate (or the smallest oblong), 1.9—3.3 cm. long, 2.5—9 mm. wide, abruptly acute at the apex, long-attenuate to the often cuneate

base, glabrous or subglabrous and shiny on both surfaces, densely impressed-punctate beneath, the margins entire or sometimes on the largest leaves with 1-4 pairs of small teeth from the widest part to the apex, often obscurely ciliate with widely scattered, small, antrorsely curved, whitish hairs, similar hairs often widely scattered on the lower surface and lower midrib on younger leaves; inflorescence terminal, solitary, short, 3-8 cm. long, about 1.5 cm. wide during anthesis, densely many-flowered, the flowers closely imbricate and ascending; peduncles very short, about 1 cm. long, spreading-pubescent like the branches and rachis; bracts lanceolate, 7-10 mm. long, about 2 mm. wide at the base, long-attenuate-acuminate at the apex, densely but minutely puberulent on the back, conspicuously and closely white-ciliolate on the margins, often with a few scattered crateriform glands; calyx cylindric, straight, about 15 mm. long, ascending, about 15 mm. long, densely but minutely puberulent throughout outside, its rim very shortly 5-apiculate, the teeth irregular; corolla hypocrateriform, lavender in bud, white during anthesis, its tube somewhat exerted from the calyx.

The type of this distinctive species was collected by H. S. Irwin, R. M. Harley, and G. L. Smith (no. 32857) on a campo in an area of gallery forest bordering riacho with adjacent campo and cerrado about 18 km. north of Alto do Paraíso, at an altitude of about 1250 meters, in the Chapada dos Veadeiros, on the Planalto do Brasil, Goiás, Brazil, on March 21, 1971, and is deposited in the United States National Herbarium at Washington. The species is obviously most closely related to S. monachinoides Moldenke.

*SYNGONANTHUS APPRESSUS* var. *CHAPADENSIS* Moldenke, var. nov.

Haec varietas a forma typica speciei recedit caulibus multiramosis, foliis ramorum angustioribus, pedunculis longioribus, capitulis maioribus, bracteis involucrentibus stramineis, etc.

This variety differs from the typical form of the species in many respects, including the fact that the abbreviated stems bear numerous, equally long, erect, terminal branches 9-12 cm. long, densely foliose, the leaves imbricate, rather loosely appressed, erect, 1.5-2.5 cm. long, lanceolate, about 2 mm. wide at the base, completely glabrous and shiny, stiff, very sharply attenuate at the apex, the sheaths densely spreading-pilose, the peduncles elongate to 30 cm. long or longer, the immature heads ovoid, about 5 mm. long and wide, the mature ones becoming hemispheric and to 1 cm. wide, turning from stramineous to blackish, the involucre bracts at first beautifully stramineous, completely glabrous, numerous, imbricate, very shiny, acute at the apex, finally turning blackish.

The type of this variety was collected by H. S. Irwin, R. M. Harley, and G. L. Smith (no. 32149) on a campo in an area of gallery forest and adjacent wet campo (brejo), at an elevation of about 1250 meters, about 20 km. north of Alto do Paraíso, in the Chapada dos Veadeiros, Goiás, Brazil, on March 19, 1971, and is deposited in my personal herbarium at Plainfield, New Jersey.

The collectors describe the plant as "ascending, the inflorescences to about 75 cm. tall. Heads light yellow-brown."

*SYNGONANTHUS BRACTEOSUS* Moldenke, sp. nov.

Herba, caulibus solitariis parce foliosis 4--6.5 cm. altis, foliis basalibus graminoides 4--6 cm. longis ca. 3 mm. latis multistriatis parcissime pilosulis glabrescentibus, foliis caulinis paucis erecto-adscentibus 5--7 mm. longis lanceolatis apice longiter attenuatis, foliis involucrantibus erectis 1.5--4 cm. longis minutissime pilosulis longo-attenuatis, pedunculis 1--4 erectis 20--30 cm. longis 5--8-costatis minutissime puberulis vel glabrescentibus; capitulis fere globosis multibracteosis, bracteis linearibus vel lineari-lanceolatis 2--8 mm. longis densissime villosis.

Herb, with a single stem rising from the basal rosette of leaves, the stem terminated by an involucre-like whorl of stem leaves and 1--4 erect peduncles; basal leaves rather few to numerous, spreading, grass-like, 4--6 cm. long, about 3 mm. wide for most of their length, rather inconspicuously many-striate beneath, abruptly attenuate to a usually more or less recurved tip at the apex, very sparsely pilosulous, soon glabrescent; stems solitary, 4--6.5 cm. tall, densely white-pilose with irregular more or less subappressed cobwebby antrorse hairs, bearing a few (4--6) scattered bract-like leaves which are erect-ascending, lanceolate, 5--7 mm. long, long-attenuate into a filiform apex, sparsely pilosulous; terminal involucre-like leaves 12--15, erect, various in size, 1.5--4 cm. long or the lowest even shorter, long-attenuate at the apex, very minutely pilosulous; sheaths greatly elongated, 5--9 cm. long, closely appressed to the peduncle, rather obscurely striate and slightly spirally twisted, very minutely pilosulous or glabrescent, the apex deeply split; peduncles 1--4, very slender, stramineous, erect, 20--30 (or more) cm. long, 5--8-costate, very minutely puberulent or glabrescent; heads single, subglobose, very conspicuously many-bracteose with strikingly uniform bractlets which are mostly stiffly erect or spreading in a pincushion-like manner or the outermost reflexed, all very narrowly lanceolate or linear-lanceolate, 2--8 mm. long, dark-brown throughout, long-attenuate to a filiform apex, very densely gray-villous throughout with wide-spreading hairs; receptacle very densely white-villous, but the villosity hidden from the outside by the much longer bracts; flowers not seen.

The type of this most distinctive species was collected by H. S. Irwin, S. F. de Fossêca, R. Souza, R. Reis dos Santos, and J. Ramos (no. 27118) on a wet campo, in summit gray sandy soil, at an elevation of about 1200 meters, about 8 km. west of Joaquim Felício, in the Serra do Cabral, Minas Gerais, Brazil, on March 7, 1970, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as having "Inflorescences to ca 50 cm tall. Heads white." Numerous heads have been dissected, but no sign of flowers found, even though the heads appear to be quite mature. It is not certain if the flowers

have not yet developed or, what is more probable, that the heads are beyond the fruiting stage. At any rate the plant has all the appearance of a Syngonanthus and I know of no described species with involucre bractlets like the ones seen here.

**SYNGONANTHUS CANDIDUS** var. **BAHIENSIS** Moldenke, var. nov.

Haec varietas a forma typica speciei recedit foliis rigide erectis 1-1.5 cm. longis prominente unicostatis, costa minute adpresso-albido-strigillosa, apice saepe minute apiculatis, vaginis perspicue tortis multicostulatis densissime adpresso-albo-strigillosis, et capitulis maturis fere 2 cm. latis.

This variety differs from the typical form of the species in having its leaves rigidly erect, 1-1.5 cm. long, prominently 1-costate beneath (almost triangular in cross-section), the costa minutely appressed-strigillose with whitish antrorse hairs which at first project from the apex in the form of a minute apiculum-like tuft which later wears off, the sheaths closely appressed, about 3 cm. long, conspicuously spirally twisted, 5- or more-costate, very densely appressed-strigillose with minute white antrorse hairs, the costae prominent at first, later flattening out, and the flower-heads almost 2 cm. wide when mature.

The type of this variety was collected by H. S. Irwin, R. M. Harley, and G. L. Smith (no. 32500) on sand in disturbed woodland with outcrops, at about 1100 meters altitude, on the Rio Ferro Doido about 18 km. east of Morro do Chapéu, in the Serra do Tombador, Bahia, Brazil, on February 18, 1971, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as a "Rosette herb, the inflorescences divergent, to about 20 cm. long. Heads white."

**SYNGONANTHUS DENSIFLORUS** var. **GLABRIFOLIUS** Moldenke, var. nov.

Haec varietas a forma typica speciei foliis utrinque semper glabris recedit.

This variety differs from the typical form of the species in having its leaves always completely glabrous on both surfaces.

The type of the variety was collected by H. S. Irwin, W. R. Anderson, and E. Y.-T. Lee (no. 34606) in a sedge meadow (brejo) at 1000 meters altitude in an area of campo sujo, sedge meadow, and adjacent cerrado, in the Serra dos Pireneus, about 21 km. east of Pirenópolis, on the Planalto do Brasil, Goiás, Brazil, on January 19, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as to 60 cm. tall. The flower-heads are in bud.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. XLI

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional & emended bibliography: Mart., Flora 24, Beibl. 2: 58, 60, & 61. 1841; J. Hutchinson, Fam. Flow. Pl. 2: 65—67 & 236, fig. 21. 1934; Moldenke in Gleason & Killip, Brittonia 3: 157—159. 1939; Rambo, An. Bot. Herb. Barb. Rodr. 1: 11, 128, & 132. (1949) and 2: 128. 1950; Moldenke, Phytologia 25: 68—99. 1972; Stalter, Castanea 37: 220. 1972.

BLASTOCAULON Ruhl.

Additional bibliography: J. Hutchinson, Fam. Flow. Pl. 2: 67 & 234. 1934; Moldenke, Phytologia 24: 335—336. 1972.

ERIOCAULON Gron.

Additional & emended bibliography: Mart., Flora 24, Beibl. 2: 58, 60, & 61. 1841; J. Hutchinson, Fam. Flow. Pl. 2: 67 & 236. 1934; Moldenke in Gleason & Killip, Brittonia 3: 157. 1939; Rambo, An. Bot. Herb. Barb. Rodr. 1: 11, 128, & 132 (1949) and 2: 128. 1950; Moldenke, Phytologia 25: 68—91. 1972; Stalter, Castanea 37: 220. 1972.

The L. C. Wheeler 12061, distributed as Eriocaulon sp., is actually Eleocharis congesta D. Don in the Cyperaceae.

ERIOCAULON AFZELIANUM Wikstr.

Additional bibliography: Gledhill, Check List Flow. Pl. Sierra Leone 31. 1962; Moldenke, Phytologia 24: 340. 1972.

ERIOCAULON ANGUSTIFOLIUM Körn.

Additional bibliography: Moldenke, Phytologia 24: 341. 1972.

Hatschbach has collected this plant in flower and fruit in August in "nas aguas de correjo sobre lageados".

Additional citations: BRAZIL: Minas Gerais: Hatschbach 29929 (Ld).

ERIOCAULON AQUATICUM (J. Hill) Druce

Additional bibliography: Stieber, Castanea 36: 277. 1971; Moldenke, Phytologia 24: 456, 473, 489, & 490 (1972) and 25: 73. 1972.

ERIOCAULON ATRATUM Körn.

Additional bibliography: Moldenke, Phytologia 24: 343 (1972) and 25: 69 & 80. 1972.

Recent collectors describe this plant as having the leaves light-green, "flowering stems" [presumably peduncles] 10—20 cm. tall, flower-heads hemispheric, 4—5 mm. in diameter, the bracts blackish, and the flowers white or grayish-white, growing in muddy places along paths or locally abundant in shady places among moist rocks at

streamsides, at 1200—1550 meters altitude, flowering in March and September.

Additional citations: CEYLON: Grierson 1043 (W—2611926); Van Beusekum & Van Beusekum 1543 (W—2656062).

**ERIOCAULON ATRATUM** var. **MAJOR** Thwaites

Additional bibliography: Moldenke, Phytologia 24: 456 (1972) and 25: 69 & 80. 1972.

Hoogland found this plant growing in the transition zone between wet patana and forest, at 2300 meters altitude, flowering in March.

Additional citations: CEYLON: Hoogland 11503 (W—2656033).

**ERIOCAULON BIFISTULOSUM** Van Heurck & Muell.-Arg.

Additional bibliography: Gledhill, Check List Flow. Pl. Sierra Leone 31. 1962; Lewalle, Bull. Jard. Nat. Belg. 42 [Trav. Univ. Off. Bujumb. Fac. Sci. C.20]: [237]. 1972; Moldenke, Phytologia 24: 346 (1972) and 25: 74. 1972.

Lewalle (1972) records E. setaceum L. from Burundi, but I assume that he is referring to E. bifistulosum. He cites Lewalle 5407.

**ERIOCAULON BROWNIANUM** var. **LATIFOLIUM** Moldenke

Additional bibliography: Moldenke, Phytologia 24: 347—348. 1972.

Hoogland found this plant growing in the transition zone between wet patana and forest and on rocks along creeks in rain-forests, at 300—2300 meters altitude, flowering in February and March.

Additional citations: CEYLON: Hoogland 11448 (W—2656337), 11502 (W—2656032).

**ERIOCAULON BURCHELLII** Ruhl.

Additional bibliography: Moldenke, Phytologia 24: 348. 1972.

Additional citations: BRAZIL: Distrito Federal: Irwin & Soderstrom 5421 (W—2587216a).

**ERIOCAULON CEYLANICUM** Körn.

Additional bibliography: Moldenke, Phytologia 24: 349. 1972.

Recent collectors have found this species growing in sunny mucky wet meadows and common in wet patanas, at 1590—2300 meters altitude, flowering in March and July and fruiting in March.

Additional citations: CEYLON: Hoogland 11505 (W); L. C. Wheeler 12176 (W—2611449).

**ERIOCAULON CINEREUM** R. Br.

Additional bibliography: Billore & Hemadri, Bull. Bot. Surv. India 11: 345. 1969; N. P. Singh, Bull. Bot. Surv. India 11: 357. 1969; Moldenke, Phytologia 24: 457, 474, & 485 (1972) and 25: 75. 1972.

Billore & Hemadri (1969) cite their no. 115926 from Kedarnath

and Singh (1969) cites his no. 33535 from Uttar Pradesh, India. Cook & Rix found this plant locally abundant as a weed in shallow water and on wet mud at the edge of ricefields in northern Italy. I am not at all convinced that all of their material represents this species. Some of it has been previously cited by me (1972) as E. luzulaefolium Mart., but studies now under way may show that all is really E. cinereum. The leaves on their nos. 42 & 49 seem far too large and broad for typical E. cinereum. Similarly, the peduncles on the California material previously cited seem far too long. The material from these introduced colonies, so far from their native homes, needs more study, and it is hoped that these studies will soon be made.

Additional citations: ITALY: Cook & Rix 30 (Z), 45 (Z), 49 (Z). JAPAN: Honshu: Hashimoto 1624 (Ws, Zu); Itô & Koyama 826 (Ws).

#### ERIOCAULON COMPRESSUM Lam.

Additional bibliography: Moldenke, Phytologia 24: 457. 1972; Stalter, Castanea 37: 220. 1972.

Stalter (1972) records this species from Georgetown County, South Carolina.

The Iltis, Crosswhite, & Kawano 21540 & 21553 and G. J. Pierce 354, distributed as E. compressum, are actually var. harperi Moldenke.

Additional citations: SOUTH CAROLINA: Berkeley Co.: Ahles, Radford, Orndorff, & Baker 56515 (Ws). GEORGIA: Sapelo Island: Duncan, Adams, & Connell 20000 (Ws).

#### ERIOCAULON COMPRESSUM var. HARPERI Moldenke

Additional bibliography: Moldenke, Phytologia 24: 351. 1972.

Recent collectors have found this plant growing in moist sandy pitcherplant flats and pine savannas with Sarracenia purpurea x drummondii, S. psittacina, Drosera tracyi, etc., in flat sandy recently burned grass-sedge prairies with Calopogon, many Sarracenia drummondii and S. sledgei and scattered Pinus sp., in wet Pinus palustris savannas with Sarracenia drummondii, S. sledgei, S. purpurea, and hybrids, Pinguicula lutea, P. caerulea, Chaptalia tomentosa, Drosera tracyi, and Polygala polygama, in damp clay roadside ditches with other species of Eriocaulon, Xyris, Drosera, Helenium, Utricularia, Chaptalia tomentosa, and Sarracenia sledgei, and along roadsides in general, flowering in April and May.

Additional citations: FLORIDA: Wakulla Co.: I. L. Wiggins 20032 (W—2587332a). ALABAMA: Baldwin Co.: Iltis, Crosswhite, & Kawano 21540 (Ws), 21553 (Ws); G. J. Pierce 354 (Ws). Washington Co.: Iltis & Univ. Wisc. Pl. Geog. Field Trip 25154 (Ws), 25156 (Ac, Ws).

ERIOCAULON CRASSISCAPUM Bong.

Additional bibliography: Moldenke, *Phytologia* 24: 352 & 470. 1972.

The Krapovickas, Cristóbal, Arbo, Maruñak, Maruñak, & Irogoyen 17252, distributed as E. crassiscapum, is actually E. leptophyllum Kunth.

ERIOCAULON CUSPIDATUM Dalz.

Additional bibliography: Moldenke, *Phytologia* 24: 349 & 353. 1972.

Additional citations: INDIA: Kerala: Manilal 5 (Ac).

ERIOCAULON DECANGULARE L.

Additional synonymy: Eriocaulon decangulilare Richardson, in herb.

Additional bibliography: Moldenke, *Phytologia* 24: 457 (1972) and 25: 82. 1972; Stalter, *Castanea* 37: 220. 1972.

Recent collectors have found this plant growing in roadside ditches, pine savannas, mixed pine-hardwood forests, open pine-palmetto forests, open swales, and inundated pineland glades, in swamp and shallow lake areas in oak woods, in shady depressions in pinelands with hammocks and cypress-heads, in boggy freshwater flats and swales with an abundance of Sarracenia spp., and in wet acid roadside ditches adjacent to Pinus palustris woods with Lachnanthes caroliniana, Rhexia alifanus, Dichromena latifolia, Polygala ramosa, and Linum medium. Stalter (1972) records it from Georgetown County, South Carolina.

The Gould 10436, distributed as E. decangulare, is actually var. minor Moldenke, while Tharp, Turner, & Johnston 54954 is f. parviceps Moldenke.

Additional citations: NORTH CAROLINA: Carteret Co.: Helms & Helms 1188 (Ws). SOUTH CAROLINA: Allendale Co.: C. R. Bell 3983 (Ws). GEORGIA: Brantley Co.: Kuns 98 (Ws). Ware Co.: Kuns 3a (Ws), 3b (Ws). FLORIDA: Alachua Co.: I. L. Wiggins 20018 (W—2587328a). Collier Co.: Lakela 29033 (Ws). Hernando Co.: R. A. Howard 12953 (Ws). Hillsborough Co.: Lakela & Almeda 30124 (Ws, Ws). Polk Co.: Conard s.n. [22 May 1964] (Ws). Volusia Co.: J. T. Richardson s.n. [1939] (Ws). ALABAMA: Baldwin Co.: Hansen & Hansen 47 (Ws); Marcks & Marcks 646 (Ws).

ERIOCAULON DECANGULARE var. MINOR Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 354 (1972) and 25: 82. 1972.

Gould found this plant growing in a small bog at the base of a gentle slope in open pasture, associated with Sarracenia and Utricularia.

Additional citations: TEXAS: Leon Co.: Gould 10436 (Ws).

ERIOCAULON DECANGULARE f. PARVICEPS Moldenke

Additional bibliography: Moldenke, Phytologia 24: 354. 1972.

Recent collectors describe this plant as having "leaves long, heads snow white", and found it growing in acid Sphagnum bogs and in hardwood forests with sandy bottoms, flowering in June. The Tharp, Turner, & Johnston 54954, cited below, was previously erroneously cited by me as E. texense Körn.

Additional citations: TEXAS: Robertson Co.: Lonard 1956 (Ws). Tyler Co.: Tharp, Turner, & Johnston 54954 (Ws).

ERIOCAULON DIANAE Fyson

Additional bibliography: Billore & Hemadri, Bull. Bot. Surv. India 11: 345. 1969; Cherian & Pataskar, Bull. Bot. Surv. India 11: 395. 1969; Moldenke, Phytologia 24: 355--356. 1972.

Billore & Hemadri (1969) found this plant growing on hill-slopes in Kedarnath and cite their no. 115530, while Cherian & Pataskar (1969) assert that it is "common" in muddy areas of paddy fields in Boripada, India, flowering and fruiting in September and October, citing their no. 112702.

ERIOCAULON HONDOENSE Satake

Additional bibliography: Moldenke, Phytologia 24: 464 (1972) and 25: 72. 1972.

Material of this species has been misidentified and distributed in some herbaria as E. sikokianum Maxim.

Additional citations: JAPAN: Honshu: Hiroe 16583 (Ws, Ws); Ohwi & Koyama 1124 (Ws); Togasi 722 (Ws), 914 (Ws), 1101 (Ws).

ERIOCAULON HUMBOLDTII Kunth

Additional bibliography: Moldenke in Gleason & Killip, Brittonia 3: 157. 1939; Moldenke, Phytologia 24: 465. 1972.

ERIOCAULON LEPTOPHYLLUM Kunth

Additional bibliography: Moldenke, Phytologia 24: 470. 1972.

Material of this species has been misidentified and distributed in some herbaria as E. crassiscapum Bong.

Additional citations: ARGENTINA: Corrientes: Krapovickas, Cristóbal, Arbo, Maruffak, Maruffak, & Irigoyen 17252 (Ws).

ERIOCAULON LIGULATUM (Vell.) L. B. Sm.

Additional bibliography: Rambo, An. Bot. Herb. Barb. Rodr. 1: 128 & 132. 1949; Moldenke, Phytologia 24: 469 & 471--473. 1972.

ERIOCAULON LINEARE Small

Additional bibliography: Moldenke, Phytologia 24: 473 (1972) and 25: 82. 1972.

The Hansen & Hansen 80, distributed as E. lineare, is actually Lachnocaulon anceps (Walt.) Morong, while Kuns 4 & 99 are Syngonanthus flavidulus (Michx.) Ruhl.

**ERIOCAULON MAGNIFICUM** Ruhl.

Additional & emended bibliography: Rambo, An. Bot. Herb. Barb. Rodr. 2: 128. 1950; Moldenke, Phytologia 24: 474--475 (1972) and 25: 86. 1972.

**ERIOCAULON MAGNUM** Abbiatti

Additional bibliography: Moldenke, Phytologia 24: 475. 1972.  
Additional citations: PARAGUAY: Krapovickas & Cristóbal 13474 (Ws).

**ERIOCAULON MEGAPOTAMICUM** Malme

Additional & emended bibliography: Rambo, An. Bot. Herb. Barb. Rodr. 1: 11 (1949) and 2: 128. 1950; Moldenke, Phytologia 24: 476. 1972.

**ERIOCAULON MELANOCEPHALUM** Kunth

Additional bibliography: Moldenke, Phytologia 24: 476 (1972) and 25: 74. 1972.

Additional citations: BRAZIL: Goiás: Irwin, Anderson, Stieber, & Lee 34424 (Id).

**ERIOCAULON MERRILLII** Ruhl.

Additional bibliography: Moldenke, Phytologia 24: 477. 1972.  
In addition to the months previously reported by me, this plant has been found flowering in November and December.  
Additional citations: GREATER SUNDA ISLANDS: Sumatra: Boeea 8764 (W--2275433).

**ERIOCAULON MICROCEPHALUM** H.B.K.

Additional bibliography: Moldenke, Phytologia 24: 477. 1972.  
Rzedowski describes this plant as growing on "ladera andesítica con vegetación de bosque de Pinus hartwegii", the flower-heads "blanco-azulosas".

The Mori & Anderson 220, distributed as E. microcephalum, is actually Paepalanthus karstenii Ruhl., while Cutler 7038 is P. manicatus var. pulvinatus Herzog.

Additional citations: MEXICO: México: J. Rzedowski 25963 (Ws, Z).

**ERIOCAULON MODESTUM** Kunth

Additional & emended bibliography: Rambo, An. Bot. Herb. Barb. Rodr. 2: 128. 1950; Moldenke, Phytologia 24: 479 & 482. 1972.

**ERIOCAULON MOLINAE** L. O. Williams

Additional bibliography: Moldenke, Phytologia 24: 480. 1972.  
Williams & Correll describe the flower-heads of this species as blackish and found the plant "common" in swampy swales and meadows at 1350 meters altitude, flowering and fruiting in December. The collection cited below is a mixture with Eleocharis sp.

Additional & emended citations: HONDURAS: Morazán: Williams & Correll 29289, in part (N, Ws).

**ERIOCAULON NILAGIRENSE Steud.**

Additional bibliography: Moldenke, *Phytologia* 24: 483. 1972.

Hoogland found this plant growing in the transition zone between wet patana and forest, at 2300 meters altitude, flowering in March.

Additional citations: CEYLON: Hoogland 11504 (W).

**ERIOCAULON NUDICUSPE Maxim.**

Additional bibliography: Moldenke, *Phytologia* 24: 484. 1972.

Additional citations: JAPAN: Honshu: Imami 956 (Ws).

**ERIOCAULON PELLUCIDUM Michx.**

Additional bibliography: Stieber, *Castanea* 36: 277. 1971; Moldenke, *Phytologia* 24: 473 & 489—491 (1972) and 25: 73. 1972.

Recent collectors report finding this plant on sandy shores of lakes and in shallow water over sand and mud bottoms. Stieber (1971) records the species from Anne Arundel County, Maryland, where he says that it is called "duckgrass" and "white buttons".

Additional citations: CANADA: NEWFOUNDLAND: Pimlott 62 (Ws). QUEBEC: Argenteuil Co.: Rolland-Germain s.n. [August 21, 1946] (Ws). Missisquoi Co.: Racicot s.n. [Sept. 8, 1936] (Ws). VERMONT: Caledonia Co.: F. C. Seymour 18034 (Ws).

**ERIOCAULON ROBUSTIUS (Maxim.) Mak.**

Additional synonymy: Eriocaulon robustus Mak., in herb.

Additional bibliography: Moldenke, *Phytologia* 24: 497. 1972.

Additional citations: JAPAN: Honshu: Hashimoto 850 (Ws); Togasi 915 (Ws); Togawi s.n. [Oct. 20, 1953] (Ws).

**ERIOCAULON SCHIMPERI Körn.**

Additional bibliography: Moldenke, *Phytologia* 25: 70—71. 1972.

Lewalle describes this plant as having white flowers and found it growing at 2150 meters altitude, flowering in November.

Additional citations: BURUNDI: Lewalle 2337 (W—2595452).

**ERIOCAULON SETICUSPE Ohwi**

Additional bibliography: Moldenke, *Phytologia* 25: 74. 1972.

Additional citations: JAPAN: Kyushu: Togasi 1415 (Ws).

**ERIOCAULON SIKOKIANUM Maxim.**

Additional bibliography: Moldenke, *Phytologia* 25: 76. 1972.

The Hiroe 16583, distributed as E. sikokianum, is actually E. hondoense Satake.

Additional citations: JAPAN: Honshu: Muramatsu s.n. [Sept. 6, 1931] (Ws).

**ERIOCAULON TEXENSE Körn.**

Additional bibliography: Moldenke, *Phytologia* 25: 82. 1972.

The Tharp, Turner, & Johnston 54954, previously cited by me (1970) as E. texense, is actually E. decangulare f. parviceps Moldenke.

**ERIOCAULON TRUNCATUM** Hamilt.

Additional bibliography: Moldenke, *Phytologia* 25: 85--86. 1972.

Wheeler found this plant growing in clay soil of sunny roadside ditches "more or less in water", flowering in June.

Additional citations: CEYLON: L. C. Wheeler 12056 (W-2611469).

**ERIOCAULON VOLKENSII** Engl.

Additional bibliography: Moldenke, *Phytologia* 25: 87. 1972.

Fosberg & Mwangangi state that this species is "rare in Carex bogs" in open scrub of Erica and other shrubs of the heath zone in Kenya, growing in sticky very black fine soil at 3300--3400 meters altitude, and found it in flower and fruit in March.

Additional citations: KENYA: Fosberg & Mwangangi 49906 (W-2580263a).

**ERIOCAULON WALKERI** Hook. f.

Additional bibliography: Moldenke, *Phytologia* 25: 87. 1972.

Wheeler found this plant in flower in July.

Additional citations: CEYLON: L. C. Wheeler 12078 (W-2611475).

**LACHNOCAULON** Kunth

Additional bibliography: Stalter, *Castanea* 37: 220. 1972; Moldenke, *Phytologia* 25: 90--94, fig. 7. 1972.

**LACHNOCAULON ANCEPS** (Walt.) Morong

Additional bibliography: Stalter, *Castanea* 37: 220. 1972; Moldenke, *Phytologia* 25: 91. 1972.

Recent collectors have found this plant growing in sunny meadows adjacent to creek-bottom woods with Mimosa pudica and in shallow bogs and roadside ditches with Sarracenia, Drosera, Zygadenus, Lycopodium carolinianum, L. alopecuroides, etc.

Material has been misidentified and distributed in some herbaria as Eriocaulon lineare Small.

Stalter (1972) records L. anceps from Georgetown County, South Carolina.

Additional citations: NORTH CAROLINA: Scotland Co.: Musselman 3001 (Ws). ALABAMA: Conecuh Co.: Hansen & Hansen 80 (Ws).

**LACHNOCAULON ECILIATUM** Small

Additional bibliography: Moldenke, *Phytologia* 25: 92. 1972.

The Meriläinen R.24, distributed as L. eciliatum, is actually L. engleri Ruhl.

**LACHNOCAULON ENGLERI** Ruhl.

Additional bibliography: Moldenke, *Phytologia* 25: 92. 1972.

Meriläinen found this plant growing in moist disturbed open sandy areas between ponds with scattered clumps of Eragrostis, Andropogon, and Juncus. Material has been misidentified and distributed in some herbaria as L. eciliatum Small. On the other hand, the Iltis, Crosswhite, Kawano, & al. 21439, distributed as L. engleri,

actually is the type collection of var. caulescens Moldenke.

Additional citations: FLORIDA: Pasco Co.: Meriläinen R.24 (Ws, Ws).

LACHNOCAULON ENGLERI var. CAULESCENS Moldenke, Phytologia 25: 117. 1973.

Bibliography: Moldenke, Phytologia 25: 117. 1973.

Citations: ALABAMA: Baldwin Co.: Iltis, Crosswhite, Kawano, & al. 21439 (Ws--type).

LACHNOCAULON MINUS (Chapm.) Small

Additional bibliography: Moldenke, Phytologia 25: 92--94, fig. 7. 1972.

Recent collectors have found this plant growing at pond margins, at the edges of limestone sinks, and even in lawns around buildings!

Additional citations: NORTH CAROLINA: Brunswick Co.: Bradley & Stevenson 3306 (Ws). SOUTH CAROLINA: Bamberg Co.: Ahles & Haes-loop 30588 (Ws). FLORIDA: Putnam Co.: I. L. Wiggins 19895 (W--2587329a).

LEIOTHRIX Ruhl.

Additional bibliography: J. Hutchinson, Fam. Flow. Pl. 2: 67 & 238. 1934; Moldenke in Gleason & Killip, Brittonia 3: 157. 1939; Moldenke, Phytologia 25: 94--99. 1972.

LEIOTHRIX CURVIFOLIA var. MICROPHYLLA Alv. Silv.

Additional bibliography: Moldenke, Phytologia 25: 98. 1972.

Anderson and his associates describe the flower-heads of this plant as white and found it growing in sandy meadows in an area of rocky campo and cerrado, sloping down to wet-sand meadows adjacent to gallery forest along streams, in sandy soil with sandstone outcrops.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 36203 (Ld).

LEIOTHRIX CURVIFOLIA var. PLANTAGO (Mart.) Ruhl.

Additional bibliography: Moldenke, Phytologia 25: 98. 1972.

Hatschbach found this plant growing in "solo arenoso junto aos afloramentos rochosos".

Additional citations: BRAZIL: Minas Gerais: Hatschbach 30178 (Ld).

LEIOTHRIX CURVIFOLIA var. SETACEA Ruhl.

Additional bibliography: Moldenke, Phytologia 25: 99. 1972.

Hatschbach has found this plant growing on wet rocky campos, flowering and fruiting in August.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 30064 (Ld).

LEIOTHRIX DISTICHOPHYLLA Alv. Silv., Fl. Mont. 1: 287--288. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 102--103. 1970; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 945. 1971.

*LEIOTHRIX DUBIA* Alv. Silv., Fl. Mont. 1: 306, pl. 193. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 90 & 103 (1970) and 21: 352. 1971; Moldenke, *Biol. Abstr.* 52: 10547. 1971; Anon., *Biol. Abstr.* 52 (19): B.A.S.I.C. S.143 & S.196. 1971; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 945. 1971.

Irwin and his associates describe this plant as producing inflorescences to 15 cm. tall and found it growing in extensive patches in cerrado on brown sand interspersed with extensive outcrops, at 1175 meters altitude, flowering in March.

Additional citations: BRAZIL: Minas Gerais: Irwin, Fonseca, Souza, Reis dos Santos, & Ramos 27648a (Ac, N).

*LEIOTHRIX DUBIA* var. *VILLOSA* Moldenke, *Phytologia* 21: 352. 1971.

Bibliography: Moldenke, *Phytologia* 21: 352. 1971; Moldenke, *Biol. Abstr.* 52: 10547. 1971; Anon., *Biol. Abstr.* 52 (19): B.A.S.I.C. S.143 & S.196. 1971; Moldenke, *Fifth Summ.* 2: 945 & 968. 1971.

Citations: BRAZIL: Minas Gerais: Irwin, Maxwell, & Wasshausen 20481 (N--type).

*LEIOTHRIX ECHINOCEPHALA* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 232. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 103--104. 1970; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 581 & 945. 1971.

*LEIOTHRIX EDWALLII* Alv. Silv., Fl. Serr. Min. 70. 1908.

Additional bibliography: Moldenke, *Phytologia* 20: 104. 1970; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 581 & 945. 1971.

*LEIOTHRIX FLAGELLARIS* (Guill.) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 237. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 174 & 189. 1969; Moldenke, *Phytologia* 20: 248--249, 261, 264, & 265. 1970; Moldenke, *Fifth Summ.* 1: 153 & 480 (1971) and 2: 500, 547, 582, 583, 633, & 945. 1971.

*LEIOTHRIX FLAVESCENS* (Bong.) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 231. 1903.

Emended synonymy: Paepalanthus falcatus Mart. ex Moldenke, *Résumé Suppl.* 1: 20, in syn. 1959 [not P. falcatus (Bong.) Körn., 1863, nor Gardn., 1972, nor Körn., 1894].

Additional & emended bibliography: Moldenke in Gleason & Killip, *Brittonia* 3: 157. 1939; J. A. Steyerma., *Act. Bot. Venez.* 1: 98 & 208. 1966; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 149, 159, 161, 174, 182--187, 189, & 191, fig. 39K. 1969; Moldenke, *Phytologia* 20: 249, 251, & 263. 1970; Reitz, *Sellowia* 22: 80. 1970; Moldenke, *Fifth Summ.* 1: 124, 129, 142, 153, 183, & 480 (1971) and 2: 499, 500, 547, 578, 581--583, 587, 592, & 945. 1971.

Additional illustrations: Tomlinson in C. R. Metcalfe, *Anat.*

Monocot. 3: 182, fig. 39K. 1969.

Irwin and his associates refer to this plant as having inflorescences 25—50 cm. tall, the flower-heads light-gray when fresh. They found it growing in gray sandy soil in cerrado and low forest among sandstone outcrops on a summit and in wet sand on sandstone in wooded river-margins, at 1100 meters altitude, flowering and fruiting in February and March. Hatschbach also found it growing in sandy soil.

The Paepalanthus falcatus (Bong.) Körn. and P. falcatus Körn., referred to in the synonymy above, are synonyms of P. pedunculatus (Bong.) Ruhl., while P. falcatus Gardn. belongs in the synonymy of P. geniculatus (Bong.) Kunth.

Additional citations: BRAZIL: Bahia: Irwin, Harley, & Smith 32384 (Ld). Minas Gerais: Hatschbach 27346 (Ld); Irwin, FONSECA, Souza, Reis dos Santos, & Ramos 27113 (Ld, N). Paraná: Hatschbach 28663 (Ld). Santa Catarina: Ule 1306 (Hg).

LEIOTHRIX FLAVESCENS var. ALPINA Moldenke, Mem. N. Y. Bot. Gard. 9: 279. 1957.

Additional bibliography: Moldenke, Phytologia 20: 109. 1970; Moldenke, Fifth Summ. 1: 124 & 130 (1971) and 2: 945. 1971.

LEIOTHRIX FLAVESCENS var. GLABRA Alv. Silv., Fl. Mont. 1: 291. 1928.

Additional bibliography: Moldenke, Phytologia 20: 109. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 945. 1971.

LEIOTHRIX FLAVESCENS var. PARVIFOLIA Moldenke, Phytologia 24: 498. 1972.

Bibliography: Moldenke, Phytologia 24: 498. 1972.

Citations: BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 28946 (Z-type).

LEIOTHRIX FLEXUOSA Alv. Silv., Fl. Mont. 1: 302, pl. 189. 1928.

Additional bibliography: Moldenke, Phytologia 20: 109—110. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 945. 1971.

LEIOTHRIX FLUITANS (Mart.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 225. 1903.

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 25, 26, 225—226, [283], 288, & 290. 1903; Moldenke, Phytologia 20: 110. 1970; Moldenke, Fifth Summ. 1: 153 & 481 (1971) and 2: 546, 547, 583, & 945. 1971.

LEIOTHRIX FLUMINENSIS Ruhl. in Engl., Pflanzenreich 13 (4-30): 230. 1903.

Additional bibliography: Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Phytologia 20: 110—111. 1970; Moldenke, Fifth Summ. 1: 153 (1971) and 2: 945. 1971.

*LEIOTHRIX FLUMINENSIS* var. *PUBERULA* Moldenke, *Phytologia* 8: 162. 1962.

Additional bibliography: Moldenke, *Phytologia* 20: 111. 1970; Moldenke, *Fifth Summ.* 1: 153 (1971) and 2: 945. 1971.

*LEIOTHRIX FULGIDA* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 233. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 186, 188, & 191. 1969; Moldenke, *Phytologia* 20: 111. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 583 & 945. 1971.

*LEIOTHRIX GLANDULIFERA* Alv. Silv., *Fl. Mont.* 1: 294. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 111-112 & 262. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 945. 1971.

*LEIOTHRIX GLAUCA* Alv. Silv., *Fl. Mont.* 1: 279, pl. 185. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 112. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 945. 1971.

*LEIOTHRIX GOMESII* Alv. Silv., *Fl. Mont.* 1: 289. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 112 & 115. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 547 & 945. 1971.

*LEIOTHRIX GOUNELLEANA* Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 298, fig. 12 C 22-29. 1908.

Additional & emended bibliography: Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 296 & 298, fig. 12 C 22-29. 1908; Moldenke, *Phytologia* 20: 112-113. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 547 & 945. 1971.

Emended illustrations: Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 296, fig. 12 C 22-29. 1908.

*LEIOTHRIX GRAMINEA* (Bong.) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 234. 1903.

Additional & emended bibliography: Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 228, 234, [283], 285, 288, & 290. 1903; Moldenke, *Phytologia* 20: 90, 100, & 113-114. 1970; Moldenke, *Fifth Summ.* 1: 154 & 481 (1971) and 2: 501, 547, 584, & 945. 1971.

*LEIOTHRIX HETEROPHYLLA* Alv. Silv., *Fl. Mont.* 1: 300, pl. 187. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 114. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 945. 1971.

*LEIOTHRIX HIRSUTA* (Wikstr.) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 229. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 149, 173, 174, 185, 186, & 189. 1969; Moldenke, *Phytologia* 20: 249. 1970; Moldenke, *Fifth Summ.* 1: 154 & 481 (1971) and 2: 502, 511, 516, 547, 584, & 945. 1971; Moldenke, *Phytologia* 23: 418 & 454. 1972.

Recent collectors have found this plant in flower and fruit in

March. The Strang & Castellanos 26306 collection, cited below, is a mixture with f. vivipara Moldenke.

Additional citations: BRAZIL: Guanabara: Strang & Castellanos 26306, in part [Herb. Brad. 49648, in part] (Ld).

LEIOTHRIX HIRSUTA var. BLANCHETIANA (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 230. 1903.

Additional bibliography: Moldenke, Phytologia 20: 249. 1970; Moldenke, Fifth Summ. 1: 154 & 478 (1971) and 2: 547, 578, & 945. 1971.

LEIOTHRIX HIRSUTA var. OBTUSA Alv. Silv., Fl. Mont. 1: 291. 1928.

Additional bibliography: Moldenke, Phytologia 20: 116. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 945. 1971.

LEIOTHRIX HIRSUTA f. VIVIPARA Moldenke, Phytologia 23: 454. 1972.

Bibliography: Moldenke, Phytologia 23: 418 & 454. 1972.

The type collection of this form is a mixture with typical L. hirsuta (Wikstr.) Ruhl.

Citations: BRAZIL: Guanabara: Strang & Castellanos 26306, in part [Herb. Brad. 49648, in part] (Z-type).

LEIOTHRIX ITACAMBIRENSIS Alv. Silv., Fl. Mont. 1: 307, pl. 194. 1928.

Additional bibliography: Moldenke, Phytologia 20: 116--117. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 945. 1971.

LEIOTHRIX LANIFERA Alv. Silv., Fl. Mont. 1: 295. 1928.

Additional bibliography: Moldenke, Phytologia 20: 117. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 945. 1971.

LEIOTHRIX LINEARIS Alv. Silv., Fl. Mont. 1: 298. 1928.

Additional bibliography: Moldenke, Phytologia 20: 117. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 945. 1971.

LEIOTHRIX LONGIPES Alv. Silv., Fl. Mont. 1: 303--304, pl. 190. 1928.

Additional & emended bibliography: Alv. Silv., Fl. Mont. 1: 303--304 & 400, pl. 190. 1928; Moldenke, Phytologia 20: 117. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 945. 1971.

LEIOTHRIX LUXURIANS (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 236. 1903.

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 235--237, 284, 288, & 290, fig. 34. 1903; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 190. 1969; Moldenke, Phytologia 20: 117--118 & 254. 1970; Moldenke, Fifth Summ. 1: 154 & 482 (1971) and 2: 547, 585, & 945. 1971.

Hatschbach found this plant growing in dry sandy soil, while Anderson and his associates found it on dry sand in open places in an area of steep sandstone cliffs and open rocky hillsides,

sloping down through sandy grassy meadows to a stream and adjacent brejo and gallery forest, at altitudes of 1300—1360 meters, flowering and fruiting in February.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35480 (Ld); Hatschbach 30065 (Ld).

LEIOTHRIX MENDESII Moldenke, *Phytologia* 3: 313—314. 1950.

Additional bibliography: Moldenke, *Phytologia* 20: 118. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 945. 1971.

LEIOTHRIX MICHAELII Alv. Silv., *Fl. Mont.* 1: 304, pl. 191. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 90, 110, & 118—119. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 547 & 945. 1971.

LEIOTHRIX MICHAELII var. LONGIPILOSA Moldenke, *Phytologia* 3: 311. 1950.

Additional bibliography: Moldenke, *Phytologia* 20: 119. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 547 & 945. 1971.

LEIOTHRIX MILHO-VERDENSIS Alv. Silv., *Fl. Mont.* 1: 291—292. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 119. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 945. 1971.

LEIOTHRIX MUCRONATA (Bong.) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 232. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 250. 1970; Moldenke, *Fifth Summ.* 1: 154 & 483 (1971) and 2: 506, 547, 586, & 945. 1971.

LEIOTHRIX NUBIGENA (Kunth) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 229. 1903.

Additional synonymy: Leiothrix nubigena Kunth ex Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 191. 1969.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 178, 179, 184, 187, 188, & 191, fig. 37 H. 1969; Moldenke, *Phytologia* 20: 250—251, 256, & 262. 1970; Moldenke, *Biol. Abstr.* 52: 1321. 1971; Moldenke, *Excerpt. Bot. A.* 19: 43. 1971; Moldenke, *Fifth Summ.* 1: 154 & 483 (1971) and 2: 508, 547, 587, & 945. 1971.

Additional illustrations: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 178, fig. 37 H. 1969.

The Eitens found this plant growing on low rounded rocky outcrops in open fields at 1250 meters altitude and describe the flowers as "white".

Additional citations: BRAZIL: Minas Gerais: Eiten & Eiten 6709 (Ld); Irwin, Reis dos Santos, Souza, & Fonseca 22056 (N).

LEIOTHRIX OBTUSIFOLIA Alv. Silv., *Fl. Serr. Min.* 69, pl. 26. 1908.

Additional bibliography: Moldenke, *Phytologia* 20: 251. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 945. 1971.

The Mendes Magalhães 2542 and Tryon & Tryon 6770 identified and cited by me in a previous installment of these notes (1970) as L. obtusifolia prove actually to represent L. sclerophylla Alv. Silv. instead.

LEIOTHRIX PEDUNCULOSA Ruhl. in Engl., Pflanzenreich 13 (4-30): 237. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 162 & 190. 1969; Moldenke, Phytologia 20: 251—252. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 587 & 945. 1971.

LEIOTHRIX PILULIFERA (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 231. 1903.

Additional & emended bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 178, 179, 185, 186, & 191, fig. 37 M. 1969; Moldenke, Phytologia 20: 50, 82, 252, & 260. 1970; Moldenke, Fifth Summ. 1: 154 & 484 (1971) and 2: 547, 588, & 946. 1971.

Additional illustrations: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 178, fig. 37 M. 1969.

Additional citations: BRAZIL: Pernambuco: Pickel 3165 (Ml).

LEIOTHRIX POLYSTEMMA Alv. Silv., Fl. Mont. 1: 293—294. 1928.

Additional bibliography: Moldenke, Phytologia 20: 252—253. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 946. 1971.

LEIOTHRIX POLYSTEMMA var. ROBUSTA Alv. Silv., Fl. Mont. 1: 294. 1928.

Additional bibliography: Moldenke, Phytologia 20: 253. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 946. 1971.

LEIOTHRIX PROLIFERA (Bong.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 236. 1903.

Additional bibliography: Moldenke, Phytologia 20: 253—254, 264, & 265. 1970; Moldenke, Fifth Summ. 1: 154 & 484 (1971) and 2: 509, 547, 589, 633, & 946. 1971.

LEIOTHRIX PROPINQUA (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 237. 1903.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 418—419, 500, & 507, pl. 53, fig. 3. 1863; Moldenke, Phytologia 20: 254—255. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 547, 589, & 946. 1971.

LEIOTHRIX RETRORSA Alv. Silv., Fl. Mont. 1: 299, pl. 186. 1928.

Additional bibliography: Moldenke, Phytologia 20: 255. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 946. 1971.

LEIOTHRIX RUFULA (A. St. Hil.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 230. 1903.

Additional & emended synonymy: Eriocaulon (Paepalanthus) trinianum Mart., Flora 24, Beibl. 2: 58. 1841. Eriocaulon trinianum

Mart. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879, in syn. 1893.

Additional bibliography: Moldenke, *Phytologia* 20: 250 & 255--257. 1970; Anon., *Biol. Abstr.* 52 (2): B.A.S.I.C. S.133. 1971; Hocking, *Excerpt. Bot. A.19*: 43. 1971; Moldenke, *Fifth Summ.* 1: 154 & 485 (1971) and 2: 497, 511, 515, 547, 580, 591, 644, & 946. 1971.

*LEIOTHRIX RUFULA* var. *ELATIOR* (Körn.) Moldenke, *Phytologia* 20: 257. 1970.

Additional bibliography: Moldenke, *Phytologia* 20: 256 & 257. 1970; Anon., *Biol. Abstr.* 52 (2): B.A.S.I.C. S.133. 1971; Moldenke, *Biol. Abstr.* 52: 719. 1971; Hocking, *Excerpt. Bot. A.19*: 43. 1971; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 590 & 946. 1971.

*LEIOTHRIX SCHLECHTENDALII* (Körn.) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 231. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 257--258 & 260. 1970; Moldenke, *Fifth Summ.* 1: 154 & 485 (1971) and 2: 547, 590, & 946. 1971.

*LEIOTHRIX SCLEROPHYLLA* Alv. Silv., *Fl. Serr. Min.* 68, pl. 26. 1908.

Additional bibliography: Moldenke, *Phytologia* 20: 258. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 946. 1971.

Recent collectors have found this species growing on rocky campos and in wet sand of grassland and sedgeland with shrubby areas and both sandstone and quartzite rocks and derived soils, flowering in November and fruiting in January and November. The Tryons encountered it at an altitude of 1295 meters. The Mendes Magalhães 2542 and Tryon & Tryon 6770, cited below, were previously (1970) incorrectly cited by me as *L. obtusifolia* Alv. Silv. and were so distributed in some herbaria.

Additional citations: BRAZIL: Minas Gerais: Hatschbach, Smith, & Ayensu 28849 (Ld); Mendes Magalhães 2542 (N); Tryon & Tryon 6770 (Z).

*LEIOTHRIX SPERGULA* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 237--238. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 258--259 & 264. 1970; Moldenke, *Fifth Summ.* 1: 154 (1971) and 2: 590 & 946. 1971.

Irwin and his associates describe this plant as a rosette herb, the inflorescences to 15 cm. tall, and the flower-heads pale-brown when fresh. They found it growing in wet sand under overhanging rock outcrops in an area of rocky summits with soil-filled crevices and small areas of white sand, at 1100 meters altitude, flowering and fruiting in March.

Additional citations: BRAZIL: Minas Gerais: Irwin, Fonsêca, Souza, Reis dos Santos, & Ramos 27905 (Ld, N).

*LEIOTHRIX SPIRALIS* (Bong.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 226. 1903.

Additional bibliography: Moldenke, Phytologia 20: 259—260. 1970; Moldenke, Fifth Summ. 1: 154 & 486 (1971) and 2: 513, 547, 590, & 946. 1971.

*LEIOTHRIX STEYERMARKII* Moldenke, Phytologia 2: 379, nom. nud. (1947), Fieldiana Bot. 28: 118—119. 1951.

Additional & emended bibliography: J. A. Steyerl., Act. Bot. Venez. 1: 69 & 208. 1966; Moldenke, Phytologia 20: 260. 1970; Moldenke, Fifth Summ. 1: 124 (1971) and 2: 946. 1971.

*LEIOTHRIX SUBULATA* Alv. Silv., Fl. Mont. 1: 288. 1928.

Additional bibliography: Moldenke, Phytologia 20: 260. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 946. 1971.

*LEIOTHRIX TENUIFOLIA* Alv. Silv., Fl. Mont. 1: 285. 1928.

Additional bibliography: Moldenke, Phytologia 20: 260—261. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 946. 1971.

*LEIOTHRIX TINGUENSIS* Herzog ex Lützelburg, Estud. Bot. Nordést. 3: 148, hyponym (1923) and in Fedde, Repert. Spec. Nov. 20: 87. 1924.

Additional bibliography: Moldenke, Phytologia 20: 261. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 547 & 946. 1971.

*LEIOTHRIX TRIANGULARIS* Alv. Silv., Fl. Mont. 1: 305—306, pl. 192. 1928.

Additional bibliography: Moldenke, Phytologia 20: 261. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 946. 1971.

*LEIOTHRIX TRICHOPUS* Alv. Silv., Fl. Mont. 1: 281. 1928.

Additional bibliography: Moldenke, Phytologia 20: 261. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 547 & 946. 1971.

*LEIOTHRIX TRIFIDA* Alv. Silv., Fl. Mont. 1: 277, pl. 184. 1928.

Additional bibliography: Moldenke, Phytologia 20: 261—262. 1970; Moldenke, Fifth Summ. 1: 154 (1971) and 2: 946. 1971.

*LEIOTHRIX TURBINATA* Gleason, Bull. Torr. Bot. Club 58: 331. 1931.

Synonymy: *Leiothrix urbinata* Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 173, sphalm. 1969.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 149, 153—162, 168, 169, 173, 175—177, 184, 186, 187, & 190, fig. 35 F & 36 G & H. 1969; Moldenke, Phytologia 20: 262. 1970; Moldenke, Fifth Summ. 1: 124 (1971) and 2: 547 & 946. 1971.

Illustrations: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 168 & 176, fig. 35 F & 36 G & H. 1969.

*LEIOTHRIX UMBRATILIS* Moldenke, Phytologia 2: 379, nom. nud. (1947) and Fieldiana Bot. 28: 119—120. 1951.

Additional & emended bibliography: J. A. Steyerl., Act. Bot.

Venez. 1: 98 & 208. 1966; Moldenke, *Phytologia* 20: 262—263. 1970; Moldenke, *Fifth Summ.* 1: 124 & 154 (1971) and 2: 548 & 946. 1971.

*LEIOTHRIX VIVIPARA* (Bong.) Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 238. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: [146], 174, & 189. 1969; Moldenke, *Phytologia* 20: 254, 258, & 263—265. 1970; Moldenke, *Biol. Abstr.* 52: 719. 1971; Hocking, *Excerpt. Bot. A.* 19: 43. 1971; Moldenke, *Fifth Summ.* 1: 154 & 487 (1971) and 2: 516, 547, 592, 633, & 946. 1971.

Irwin and his associates state that the inflorescences of this plant attain a length of 40 cm. and that it grows on campos in areas of campo, cerrado on outcrops, and wooded valleys. It has been collected at 1200 meters altitude, flowering and fruiting in March.

Additional citations: BRAZIL: Minas Gerais: Irwin, Fonseca, Souza, Reis dos Santos, & Ramos 28299 (N, Z); Irwin, Reis dos Santos, & Fonseca 23372 (N).

*LEIOTHRIX VIVIPARA* var. *ANGUSTA* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 238. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 254 & 265—265. 1970; Moldenke, *Fifth Summ.* 1: 155 (1971) and 2: 509, 592, & 946. 1971.

Hatschbach found this plant in flower in September.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27489 (Ft.).

*LEIOTHRIX VIVIPARA* var. *LONGIPILOSA* Moldenke, *Phytologia* 13: 218. 1966.

Additional bibliography: Moldenke, *Phytologia* 20: 265. 1970; Moldenke, *Biol. Abstr.* 52: 719. 1971; Moldenke, *Fifth Summ.* 1: 155 (1971) and 2: 946. 1971.

*MESANTHEMUM* Körn., *Linnaea* 27: 572—576. 1856.

Additional & emended bibliography: Pers., *Sp. Pl.* 1: 284. 1817; J. Hutchinson, *Fam. Flow. Pl.* 2: 67 & 239. 1934; Perrier de la Bâthie, *Cat. Pl. Madag in Acad. Malg.* 22. 1934; Perrier de la Bâthie, *Biogéogr. Pl. Madag.* 47. 1936; Jacques-Félix, *Bull. Soc. Bot. France* 94: [143]—151 & 461. 1947; Goossens, *Suid-Afr. Blom. Pl.* 225. 1953; Lind & Tallantire, *Some Com. Flow. Pl. Uganda*, ed. 1, 198. 1962; Gledhill, *Check List Flow. Pl. Sierra Leone* 31. 1962; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 158, 161, 163, 173, 178, 179, 185—187, 189, & 191, fig. 37 F & G. 1969; Adam, *Bull. Inst. Fond. Afr. Noire A.* 32: 1003. 1970; Moldenke, *Phytologia* 20: 265—269 & 277—287 (1970) and 20: 509. 1971; Moldenke, *Fifth Summ.* 1: 210, 213, 215—219, 222, 225—227, 231, 238, 244, 246, 248, 252, & 262 (1971) and 2: 501, 502, 505, 509, 510, 518, 571, 572, 746, & 946. 1971; Moldenke, *Biol. Abstr.* 52: 95 & 719. 1971; Anon., *Biol. Abstr.* 52 (1): B.A.S.I.C. S.147 & S.175 (1971) and 52 (2): B.A.S.I.C. S. 50, S.80, & S.145. 1971; Cuf., *Bull. Jard.*

Bot. Belg. 41 (3): Suppl. 1507. 1971; Hocking, Excerpt. Bot. A. 19: 43. 1971; Lind & Tallantire, Some Com. Flow. Pl. Uganda, ed. 2, 198 & 243. 1971; Moldenke, Phytologia 23: 434 & 509. 1972.

Jacques-Félix (1947) gives the following key [slightly modified by me] to the species of this genus known to him:

1. Plantes annuelles, n'atteignant guère que 20 cm.; pédoncules grêles, de moins de 0,5 mm. de diamètre, bractées de l'involucre plus courtes que les fleurs; fleurs (au moins les ♀) dépourvues de sépales.
2. Fleurs jaunes, bractées de l'involucre entières, brunes à marge hyaline, poils mous blanchâtres épars; bractées florales longuement plumeuses.....1. M. auratum.
- 2a. Fleurs blanches; bractées de l'involucre lacérées au sommet, claires, quelques poils raides à la base de la rangée externe, glabres ailleurs; pas de bractées florales.....2. M. albidum.
- 1a. Plantes vivaces, au moins par le rhizome, généralement robustes, de plus de 20 cm. de haut, et à pédoncules de plus de 0 mm. 5 de diamètre; fleurs pourvues de sépales, ceux-ci parfois caducs.
3. Bractées de la rangée interne nettement plus longues que les autres, lanceolées, dépassant nettement les fleurs.
4. Herbe à rhizome vivace mais à feuilles rares, linéaires; pédoncule grêle, de 0 mm. 5 à 1 mm.; involucre à 2—3 rangées de bractées scarieuses, diversement pileuses ou glabrescentes; bractée florale glabre.....3. M. prescottianum.
- 4a. Herbe cespiteuse à feuilles linéaires lancéolées, pédoncule robuste, involucre à 5 rangées de bractées veloutées; bractée florale velue.....4. M. bennae.
- 3a. Bractées de la rangée interne sensiblement de même niveau que les fleurs.
5. Bractées de l'involucre, blanches à la base et noires au sommet, les externes linéaires-ovales, obtuses, les internes aiguës, denticulées; fleurs sessiles.....5. M. roseni.
- 5a. Bractées de l'involucre unicolores.
6. Bractées molles, velues, aiguës; corolle ♂ nettement lobée au sommet; feuilles lancéolées, velues au moins lorsqu'elles sont jeunes.....6. M. jaegerii.
- 6a. Bractées plus ou moins scarieuses, glabres ou à poils apprimés.
7. Feuilles étroitement linéaires, glabres ou à peine pubérulentes, bractées externes obtuses.....7. M. radicans.
- 7a. Feuilles linéaires lancéolées ou linéaires mais velues.
8. Feuilles linéaires lancéolées, glabrescentes.
9. Feuilles petites (1 x 10 cm.); sépales blanchâtres; fleurs ♀ pedicellées.....8. M. erici-rosenii.
- 9a. Feuilles ± grandes (3 x 25 cm.); bractées externes de l'involucre ovales; sépales noirs; fleurs ♀ subsessiles.....9. M. rutenbergianum.
- 8a. Feuilles linéaires; jeunes feuilles et gaines velues; bractées externes de l'involucre triangulaires.

10. Sépales blanchâtres.....10a. M. pubescens f. alba.  
 10a. Sépales noirs.....10b. M. pubescens f. nigra.

**MESANTHEMUM AFRICANUM** Moldenke, Phytologia 3: 113--114. 1949.

Additional bibliography: Moldenke, Phytologia 20: 268. 1970; Moldenke, Biol. Abstr. 52: 719. 1971; Hocking, Excerpt. Bot. A. 19: 43. 1971; Moldenke, Fifth Summ. 1: 248 & 252 (1971) and 2: 946. 1971.

**MESANTHEMUM ALBIDUM** H. Lecomte, Bull. Soc. Bot. France 55: 601--602, fig. 2. 1908.

Additional bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: 144 & 149. 1947; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 173 & 189. 1969; Moldenke, Phytologia 20: 269. 1970; Moldenke, Fifth Summ. 1: 215 & 217 (1971) and 2: 946. 1971.

**MESANTHEMUM AURATUM** H. Lecomte, Bull. Soc. Bot. France 55: 599--602, fig. 1. 1908.

Additional bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: [143], 144, & 149. 1947; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 173, 186, 187, & 189. 1969; Moldenke, Phytologia 20: 269. 1970; Moldenke, Fifth Summ. 1: 217 (1971) and 2: 946. 1971.

**MESANTHEMUM BENNAE** Jacques-Félix, Bull. Soc. Bot. France 94: 144--146. 1947.

Additional & emended bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: 144--146, 149, & 461. 1947; Moldenke, Phytologia 20: 269. 1970; Moldenke, Fifth Summ. 1: 217 (1971) and 2: 946. 1971.

Illustrations: Jacques-Félix, Bull. Soc. Bot. France 94: 145. 1947.

**MESANTHEMUM ERICI-ROSENII** T. Fries in R. E. Fries, Wiss. Ergebn. Schwed. Rhod.-Kong.-Exped. 1911-12 Bot. 1 (2): 215--219, pl. 16. 1916.

Additional synonymy: Mesanthemum erici rosenii T. Fries ex Jacques-Félix, Bull. Soc. Bot. France 94: 149. 1947.

Additional bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: 144, 148, & 149. 1947; Moldenke, Phytologia 20: 277, 283, & 284. 1970; Moldenke, Biol. Abstr. 52: 95 & 719. 1971; Moldenke, Fifth Summ. 1: 218, 231, & 246 (1971) and 2: 571 & 946. 1971; Hocking, Excerpt. Bot. A. 19: 43. 1971.

**MESANTHEMUM JAEGERII** Jacques-Félix, Bull. Soc. Bot. France 94: 146--147. 1947.

Additional & emended bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: 144, 146--147, 149, & 461. 1947; Moldenke, Phytologia 20: 277. 1970; Moldenke, Fifth Summ. 1: 218 (1971) and 2: 571 & 946. 1971.

Illustrations: Jacques-Félix, Bull. Soc. Bot. France 94: 147.

1947.

MESANTHEMUM PRESCOTTIANUM (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 472. 1863.

Additional bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: 144--145 & 149. 1947; Gledhill, Check List Flow. Pl. Sierra Leone 31. 1962; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 189. 1969; Moldenke, Phytologia 20: 277--278 & 284. 1970; Moldenke, Fifth Summ. 1: 217--219 (1971) and 2: 509, 571, 572, & 946. 1971.

MESANTHEMUM PUBESCENS (Lam.) Körn., Linnaea 27: 575. 1856.

Additional synonymy: Mesanthemum pubescens f. alba Jacques-Félix, Bull. Soc. Bot. France 94: 144 & 149. 1947. Mesanthemum pubescens f. nigra Jacques-Félix, Bull. Soc. Bot. France 94: 144 & 149. 1947.

Additional bibliography: Pers., Sp. Pl. 1: 284. 1817; Jacques-Félix, Bull. Soc. Bot. France 94: 144 & 148--149. 1947; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161, 173, & 189. 1969; Moldenke, Phytologia 20: 278--280, 283, & 286. 1970; Moldenke, Fifth Summ. 1: 262 (1971) and 2: 505, 509, 571, & 946. 1971.

Illustrations: Jacques-Félix, Bull. Soc. Bot. France 94: 148. 1947.

Jacques-Félix (1947) proposes f. alba for the typical form of this species, citing the type, Commerson s.n., and "avec doute" Baron 458, both from Madagascar, with the sepals said to be whitish. He proposes f. nigra, with black sepals, for Decary 17200 and Perrier de la Bâthie 2245 from Manankozo, Madagascar. In my dissection I have found the staminate sepals in general to be yellowish and the pistillate sepals fuscous in the same floral heads. I therefore think that his forms are hardly tenable and hereby reduce them to synonymy. If they were to be accepted they would have to be written in the neuter form.

MESANTHEMUM RADICANS (Benth.) Körn., Linnaea 27: 573. 1856.

Additional bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: 144 & 146--149. 1947; Lind & Tallantire, Some Com. Flow. Pl. Uganda, ed. 1, 198. 1962; Gledhill, Check List Flow. Pl. Sierra Leone 31. 1962; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161, 173, 178, 179, 185--187, 189, & 191, fig. 37 F & G. 1969; Moldenke, Phytologia 20: 277, 280--285, & 287. 1970; Adam, Bull. Inst. Fond. Afr. Noire A.32: 1003. 1970; Moldenke, Fifth Summ. 1: 210, 215--219, 222, 225--227, 231, 238, 244, & 246 (1971) and 2: 501, 502, 510, 571, 572, & 946. 1971; Lind & Tallantire, Some Com. Flow. Pl. Uganda, ed. 2, 198 & 243. 1971.

Additional illustrations: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 178, fig. 37 F & G. 1969.

Lind & Tallantire (1962) describe this plant as an herb, the leaves narrowly lanceolate, up to 40 cm. long and all basal, and the flowers whitish, in a flattened head up to 1--2 cm. across, on a peduncle (stalk) up to 60 cm. long, inhabiting swamp edges

and wet grasslands in Uganda. Fosberg describes the flower-heads as white and asserts that the species is common in dense grassland on wet black humic sandy soil. He found it growing at about 1 m. altitude in Ivory Coast.

Additional citations: IVORY COAST: F. R. Fosberg 40427 (W-2580419a).

*MESANTHEMUM REDUCTUM* H. Hess, Bericht. Schweitz. Bot. Gesell. 65: 183--185, fig. 1--3. 1955.

Additional bibliography: Moldenke, *Phytologia* 20: 284--285. 1970; Moldenke, *Fifth Summ.* 1: 244 (1971) and 2: 946. 1971.

*MESANTHEMUM ROSENI* Pax in Engl., Bot. Jahrb. 39: 609. 1907.

Additional bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: 144, 146, & 149. 1947; Moldenke, *Phytologia* 20: 283 & 285. 1970; Cuf., Bull. Jard. Bot. Belg. 41 (3): Suppl. 1507. 1971; Moldenke, *Fifth Summ.* 1: 213 (1971) and 2: 946. 1971; Moldenke, *Phytologia* 23: 434. 1972.

*MESANTHEMUM RUBRUM* Moldenke, *Résumé Suppl.* 4: 6, nom. nud. (June 5, 1962) and *Phytologia* 8: 390--391. December 10, 1962.

Additional bibliography: Moldenke, *Phytologia* 20: 285. 1970; Moldenke, *Fifth Summ.* 1: 217 (1971) and 2: 946. 1971.

*MESANTHEMUM RUTENBERGIANUM* Körn., Abh. Naturwiss. Ver. Bremen 7: 34. 1880.

Additional bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: [143], 144, 146, 148, & 149. 1947; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 161, 173, 185, 186, & 189. 1969; Moldenke, *Phytologia* 20: 280 & 283--287. 1970; Moldenke, *Biol. Abstr.* 52: 95. 1971; Moldenke, *Fifth Summ.* 1: 262 (1971) and 2: 571, 572, & 946. 1971.

Additional illustrations: Jacques-Félix, Bull. Soc. Bot. France 94: 148. 1947.

*PAEPALANTHUS* Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 13, pl. 1, fig. 1, & pl. 2, fig. 1. 1835.

Additional synonymy: *Xeractis* Körn., in herb.

Additional & emended bibliography: J. F. Gmel. in L., *Syst. Nat.*, ed. 13, 2: 206 & 867. 1791; Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 10, 12--15, 23, 42, 57, & 60, pl. 1, fig. 1, & pl. 2, fig. 1. 1835; Pers., *Sp. Pl.* 1: 283 & 284. 1817; Mart., *Flora* 24, Beibl. 2: 35, 36, 58, 60, & 61. 1841; Körn. in Mart., *Fl. Bras.* 3 (1): 276--285, 288, 290--302, 305--471, 484, 491, 495, 499--500, 502--508, & 559--562, pl. 39--60. 1863; Böck., *Flora* 56: 90--92. 1873; Arech., *Anal. Mus. Montevid.* 4 (1): 23--24. 1902; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 287--299, fig. 10 A--C & 11 A--D. 1908; J. Hutchinson, *Fam. Flow. Pl.* 2: 66, 67, & 240. 1934; J. F. Macbr., *Field Mus. Publ. Bot.* 13 (363): 489--494 & i. 1936; Moldenke in Gleason & Killip,

Brittonia 3: 157—159. 1939; Moldenke, Bull. Torr. Bot. Club 68: 67—70. 1940; Rambo, An. Bot. Herb. Barb. Rodr. 1: 128. 1949; Goossens, Suid-Afrik. Blom Pl. 224. 1953; Moldenke in J. A. Stayerm., Fieldiana Bot. 28: 824—825. 1957; A. Robyns, Excerpt. Bot. A.1: 215. 1959; Gledhill, Check List Flow. Pl. Sierra Leone 31. 1962; Tomlinson, Journ. Linn. Soc. Lond. Bot. 59: 169—172, fig. 18—30. 1964; Eden, McGill Univ. Savanna Res. Ser. 1: 135—137. 1964; J. A. Stayerm., Act. Bot. Venez. 1: 10, 22, 41, 47, 68, 69, 72, 73, 75, 83, 87, 89, 94, & 222—223. 1966; Rendle, Classif. Flow. Pl., ed. 2, 1: 274. 1967; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146]—151, 158—170, 173—179, & 184—191, fig. 30, 31, 34, 35 G, 36 I & J, & 37 C—E, I, & J. 1969; Oberwinkler, Pterid. & Sperm. Venez. 27 & 52. 1970; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo 2: xxxiii. 1970; Hocking, Excerpt. Bot. A.16: 39. 1970; Soukup, Raymondiana 3: 32 & 74. 1970; Reitz, Sellowia 22: 104. 1970; Moldenke, Phytologia 20: 7, 10, 11, 14, 18, 25, 27, 36, 39, 50, 287—308, 340, 346, 349—368, & 414—425 (1970), 20: 504—510 (1971), and 21: 509. 1971; Moldenke, Biol. Abstr. 52: 95, 714, 719, 1918, & 5935. 1971; Anon., Biol. Abstr. 51 (24): B. A.S.I.C. S.147 & S.175 (1971), 52 (4): B.A.S.I.C. S.35, S.77, & S. 165 (1971), and 52 (11): B.A.S.I.C. S.88. 1971; Moldenke, Excerpt. Bot. A.18: 445 & 446. 1971; Hocking, Excerpt. Bot. A.19: 43. 1971; Moldenke, Fifth Summ. 1: 72, 82, 88, 91, 97, 99, 103, 112, 118, 119, 124—126, 130, 132, 134, 136, 142, 143, 157—168, 180, 183, 187, 192, 217—219, 226, 227, 231, 238, 239, 262, 280, 366, 375, 377, 395, 414, 438, 477—487 (1971) and 2: 492—497, 499—518, 546, 547, 577—593, 604, 635, 636, 642, 738—744, 746, 774, 776—778, 788, 791, 946—959, 966—968, 972, & 973. 1971; Moldenke, Phytologia 23: 181, 211, 417, 418, 434, & 509 (1972) and 24: 19, 344, 482, 498—499, & 510. 1972; Moldenke, Biol. Abstr. 53: 5252 (1972) and 54: 1189 & 1725. 1972; Anon., Biol. Abstr. 53 (10): B.A.S.I.C. S.178 (1972) and 54 (3): B.A.S.I.C. S.184 & S.189. 1972; Moldenke, Phytologia 24: 343 & 344 (1972) and 25: 73 & 95. 1972.

Limnoxeranthemum Salzm. and Limnoxeranthemum Salzm. ex Steud., previously regarded by me as synonyms of Paepalanthus, belong instead in the synonymy of Syngonanthus Ruhl., since the only species placed in Limnoxeranthemum are actually species of Syngonanthus.

Rendle (1967) describes Paepalanthus as a genus of "230 spp., mostly trop. S. Am." Actually 583 species, varieties, and forms are at present recognized in the genus.

The Bull. Torrey Bot. Club 68: 67—70 references previously cited by me as "1941" were actually issued on December 31, 1940, in spite of the fact that "1941" is the title-page date of the issue.

PAEPALANTHUS ACANTHOLIMON Ruhl. in Engl., Pflanzenreich 13 (4-30): 163—164. 1903.

Additional bibliography: Moldenke, Phytologia 20: 297—298. 1970; Moldenke, Biol. Abstr. 52: 95. 1971; Moldenke, Fifth Summ. 1: 157 (1971) and 2: 946. 1971.

**PAEPALANTHUS ACANTHOPHYLLUS** Ruhl. in Engl., Pflanzenreich 13 (4-30): 186. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 190. 1969; Moldenke, Phytologia 20: 298--299. 1970; Moldenke, Fifth Summ. 1: 157 (1971) and 2: 947. 1971.

Irwin and his associates describe this plant as erect, simple or few-branched, to 1.75 m. tall, the flower-heads white and "strictly erect", and found it growing on campos in an area of gallery forest and adjacent wet campo (brejo) and "locally common" in wet places on rocky slopes at 1200--1250 meters altitude, flowering and fruiting in March, June, and October. They also encountered it in cerrado on the upper slopes and summit of hills. Harley found it growing in wet grassland by a small stream, while Hatschach encountered it on rocky campos, flowering and fruiting in July.

Anderson and his associates describe *P. acanthophyllus* as "trailing or erect by leaning on shrubs, to 1 m. tall, heads white" and found it growing in an area of sandstone outcrops with shrubby vegetation, adjacent grassy slopes, and the valley of a small stream, mostly sandy soil, but with overlying black humus in many places, flowering in February.

Additional citations: BRAZIL: Goiás: Duarte 10668 [Herb. Brad. 48792] (Ld); Harley s.n. [24 March 1971] (Ft--9974); Hatschbach 29948 (Ld); Irwin, Grear, Souza, & Reis dos Santos 14300 (Ld, N); Irwin, Harley, & Smith 32704 (Ld); Irwin, Souza, & Reis dos Santos 9400 (Ld, N). Minas Gerais: Anderson, Stieber, & Kirkbride 35857 (Ld).

**PAEPALANTHUS ACCRESCENS** Alv. Silv., Fl. Mart. 1: 96--98, pl. 62 & 63 [a]. 1928.

Additional bibliography: Moldenke, Phytologia 20: 299. 1970; Moldenke, Fifth Summ. 1: 157 (1971) and 2: 947. 1971.

**PAEPALANTHUS ACCRESCENS** var. **GLABRESCENS** Alv. Silv., Fl. Mont. 1: 98. 1928.

Additional bibliography: Moldenke, Phytologia 20: 299. 1970; Moldenke, Fifth Summ. 1: 157 (1971) and 2: 947. 1971.

**PAEPALANTHUS ACTINOCEPHALOIDES** Alv. Silv., Fl. Mont. 1: 135--136, pl. 84. 1928.

Additional bibliography: Moldenke, Phytologia 20: 299--300. 1970; Moldenke, Fifth Summ. 1: 157 (1971) and 2: 947. 1971.

**PAEPALANTHUS ACULEATUS** Alv. Silv., Fl. Serr. Min. 65, pl. 24. 1908.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146]. 1969; Moldenke, Phytologia 20: 300. 1970; Moldenke, Fifth Summ. 1: 157 (1971) and 2: 947. 1971.

**PAEPALANTHUS ACUMINATUS** Ruhl. in Engl., Pflanzenreich 13 (4-30): 217. 1903.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 175, 184, 187, & 191. 1969; Moldenke, *Phytologia* 20: 300--301. 1970; Moldenke, *Fifth Summ.* 1: 157 (1971) and 2: 947. 1971.

*PAEPALANTHUS ACUMINATUS* var. *LONGIPILOSUS* Moldenke, *Phytologia* 3: 314. 1950.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 191. 1969; Moldenke, *Phytologia* 20: 301. 1970; Moldenke, *Fifth Summ.* 1: 157 (1971) and 2: 947. 1971.

*PAEPALANTHUS ACUTALIS* Alv. Silv., *Fl. Mont.* 1: 258--259, pl. 170 [bis]. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 301. 1970; Moldenke, *Fifth Summ.* 1: 157 (1971) and 2: 947. 1971.

*PAEPALANTHUS ACUTIPILUS* Alv. Silv., *Fl. Mont.* 1: 173--175, pl. 112. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 301--302. 1970; Moldenke, *Fifth Summ.* 1: 157 (1971) and 2: 947. 1971.

Irwin and his associates describe this plant as having ascending stems, to 30 cm. long, and light-gray flower-heads, and found it growing beneath overhanging rocks on steep iron-rich rocky slopes, at 1800--2000 meters altitude, flowering and fruiting in January.

Additional citations: BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 30224 (Z).

*PAEPALANTHUS AEQUALIS* (Vell.) J. F. Macbr., *Field Mus. Publ. Bot.* 11: 43. 1931.

Emended synonymy: *Paepalanthus blepharocnemis* var.  $\sigma$  Körn. in *Mart., Fl. Bras.* 3 (1): 376--377 & 499, pl. 48, fig. 3. 1863.

Additional & emended bibliography: Körn. in *Mart., Fl. Bras.* 3 (1): 276, 281, 376--377, 499, & 507, pl. 48, fig. 3. 1863; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 174 & 189. 1969; Moldenke, *Phytologia* 20: 302--304 & 421. 1970; Moldenke, *Fifth Summ.* 1: 157 & 477 (1971) and 2: 578 & 947. 1971.

This species is said by Ruhland (1903) to be closely related to *P. mendoncianus* Ruhl., especially in its short sheaths, but differs in its non-glabrous leaves and in the shape and color of its involucre bracts.

*PAEPALANTHUS AEREUS* Alv. Silv., *Fl. Mont.* 1: 161--162, pl. 102. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 304. 1970; Moldenke, *Fifth Summ.* 1: 157 (1971) and 2: 577, 587, & 947. 1971.

*PAEPALANTHUS ALBESCENS* Alv. Silv., *Fl. Mont.* 1: 229--230, pl. 152. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 304. 1970; Moldenke, *Fifth Summ.* 1: 157 (1971) and 2: 947. 1971.

*PAEPALANTHUS ALBICEPS* Alv. Silv., Fl. Mont. 1: 172—173, pl. 111. 1928.

Additional bibliography: Moldenke, Phytologia 20: 301 & 304—305. 1970; Moldenke, Fifth Summ. 1: 157 (1971) and 2: 947. 1971.

*PAEPALANTHUS ALBO-TOMENTOSUS* Herzog ex Lützelburg, Estud. Bot. Nordest. 3: 148, hyponym (1923) and in Fedde, Repert. Spec. Nov. 20: 83. 1924.

Additional bibliography: Moldenke, Phytologia 20: 305. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 577 & 947. 1971.

*PAEPALANTHUS ALBO-VAGINATUS* Alv. Silv., Fl. Mont. 1: 233—234, pl. 155. 1928.

Additional bibliography: Moldenke, Phytologia 20: 349. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971.

Additional citations: BRAZIL: Paraná: Hatschbach 22145 (N), 24712 (Ft).

*PAEPALANTHUS ALBO-VILLOSUS* Alv. Silv., Fl. Mont. 1: 33—34, pl. 15. 1928.

Additional bibliography: Moldenke, Phytologia 20: 306 & 360. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 577, 593, & 947. 1971.

*PAEPALANTHUS ALLEMANII* C. Diogo, Bol. Mus. Nac. Rio Jan. 1: [27]—28. 1923.

Additional bibliography: Moldenke, Phytologia 20: 306—307. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971.

*PAEPALANTHUS ALPINUS* Körn. in Mart., Fl. Bras. 3 (1): 409—410. 1863.

Additional bibliography: Moldenke, Phytologia 20: 349 & 353. 1970; Moldenke, Fifth Summ. 1: 118 & 477 (1971) and 2: 947 & 972. 1971.

*PAEPALANTHUS ALSINOIDES* C. Wright ex Sauv., Anal. Acad. Ci. Habana 8: 49—40. 1871.

Additional bibliography: Moldenke, Phytologia 20: 349—350. 1970; Moldenke, Biol. Abstr. 52: 95. 1971; Moldenke, Fifth Summ. 1: 97 & 477 (1971) and 2: 947. 1971.

*PAEPALANTHUS ALSINOIDES* var. *MINIMUS* Jennings, Ann. Carnegie Mus. 11: 89, pl. 17, fig. E—H. 1917.

Additional bibliography: Moldenke, Phytologia 20: 349—350. 1970; Moldenke, Fifth Summ. 1: 97 & 99 (1971) and 2: 947. 1971.

*PAEPALANTHUS AMOENUS* (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 316. 1863.

Additional bibliography: Moldenke, Phytologia 20: 350—352. 1970; Moldenke, Fifth Summ. 1: 158 & 477 (1971) and 2: 493, 505, 577, 585, 947, & 972. 1971; Moldenke, Biol. Abstr. 53: 5252. 1972;

Anon., Biol. Abstr. 53 (10): B.A.S.I.C. S.178. 1972.

Irwin and his associates describe this plant as an erect herb, 1--2 m. tall, the stem simple, the flower-heads white or gray, grayish, light-gray, very light-gray, or gray-brown, and found the plant "occasional" in wet sand of cerrado, on campos or on wet slopes of campos in areas of campos and cerrado, at altitudes of 950--1200 meters, flowering in March.

The Mello Barreto 2491 [Herb. Jard. Bot. Bello Horiz. 4053], previously cited by me (1952) as P. amoenus, is actually the type collection now of f. prolifer Moldenke. Material of P. amoenus has also been misidentified and distributed in some herbaria as P. acanthophyllus Ruhl.

Additional citations: BRAZIL: Distrito Federal: Irwin, Grear, Souza, & Reis dos Santos 13925 (N, Rf), 15375 (Ac, N); Irwin, Souza, & Reis dos Santos 11580 (N, Rf), 11670 (Ac, N). Goiás: Irwin, Grear, Souza, & Reis dos Santos 12358 (Ac, N), 13588 (Ac, N); Irwin, Harley, & Smith 32034 (Ld); Irwin, Reis dos Santos, Souza, & FONSECA 25649 (N); Irwin, Souza, Grear, & Reis dos Santos 17860 (Ld, N).

PAEPALANTHUS AMOENUS var. CURRALENSIS Alv. Silv., Fl. Mont. 1: 401. 1928.

Additional bibliography: Moldenke, Phytologia 20: 352. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971.

PAEPALANTHUS AMOENUS f. PROLIFER Moldenke, Phytologia 21: 417. 1971.

Bibliography: Moldenke, Phytologia 4: 134 (1952) and 21: 417. 1971; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971; Moldenke, Biol. Abstr. 53: 5252. 1972; Anon., Biol. Abstr. 53 (10): B.A.S.I.C. S.178. 1972.

The type specimen of this form was erroneously cited by me in 1952 as typical P. amoenus (Bong.) Körn.

Citations: BRAZIL: Minas Gerais: Mello Barreto 2491 [Herb. Jard. Bot. Bello Horiz. 4053] (N--type).

PAEPALANTHUS ANDICOLA Körn. in Mart., Fl. Bras. 3 (1): 408. 1863.

Additional bibliography: Moldenke, Phytologia 20: 352--353. 1970; Moldenke, Fifth Summ. 1: 118, 124, 136, & 478 (1971) and 2: 947 & 972. 1971; Moldenke, Phytologia 23: 417. 1972.

Additional & emended citations: COLOMBIA: Cundinamarca: García-Barriga 18034 (N, N, W--2569355a).

PAEPALANTHUS ANDICOLA var. VILLOSUS Moldenke, Phytologia 2: 416. 1948.

Additional bibliography: Moldenke, Phytologia 20: 353. 1970; Moldenke, Fifth Summ. 1: 118 (1971) and 2: 947. 1971; Moldenke, Phytologia 23: 417. 1972.

López-Palacios collected this plant at 2320 meters altitude and describes it as "planta arrosetada; hojas lineal lanceoladas,

subcoriáceas; envés velutinoso en las hojas tiernas, pilosas en las adultas; haz glabrescente, marge ciliado. Flores immaturas unas, otras demasiado pasadas."

Additional citations: VENEZUELA: Táchira: López-Palacios 2575 (2).

PAEPALANTHUS APACARENSIS Moldenke, Mem. N. Y. Bot. Gard. 9: 408. 1957.

Additional bibliography: Moldenke, Phytologia 20: 353. 1970; Moldenke, Fifth Summ. 1: 124 (1971) and 2: 947. 1971.

PAEPALANTHUS APPLANATUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 169—170, fig. 2 D. 1903.

Additional bibliography: Moldenke, Phytologia 20: 353—354. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971.

PAEPALANTHUS ARBORESCENS Alv. Silv., Fl. Mont. 1: 205—206, pl. 135. 1928.

Additional bibliography: Moldenke, Phytologia 20: 354. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 577 & 947. 1971.

PAEPALANTHUS ARCHERI Moldenke, Bull. Torrey Bot. Club 68: 67. 1940.

Additional & emended bibliography: Moldenke, Bull. Torrey Bot. Club 68: 67. 1940; Moldenke, Phytologia 20: 354—355. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 577 & 947. 1971.

The Eitens found this plant growing in fine sandy soil in fields with outcropping itacolomite quartzite slabs, at 1150 m. altitude, flowering in November.

The original description of the species was actually published on December 31, 1940 -- not "1941" as previously stated by me in an earlier installment of these notes, in spite of the fact that "1941" appears on the title-page of the issue.

Additional citations: BRAZIL: Minas Gerais: Eiten & Eiten 6852 (2).

PAEPALANTHUS ARENICOLA Alv. Silv., Fl. Mont. 1: 144—145, pl. 90. 1928.

Additional bibliography: Moldenke, Phytologia 20: 355. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971.

Additional citations: BRAZIL: Goiás: Irwin, Reis dos Santos, Souza, & Fonsêca 24936 (N).

PAEPALANTHUS ARETIOIDES Ruhl. in Engl., Pflanzenreich 13 (4-30): 164. 1903.

Additional bibliography: Moldenke, Phytologia 20: 355—356. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971.

PAEPALANTHUS ARGENTEUS (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 343. 1863.

Additional bibliography: Moldenke, Phytologia 20: 356—357.

1970; Moldenke, Fifth Summ. 1: 158 & 478 (1971) and 2: 577 & 947. 1971.

Hatschbach encountered this plant at 1100 meters altitude, in flower and fruit in September, growing on sandy campos and in sandy soil near rivers.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27254 (Rf), 27403 (Ft); Irwin, Reis dos Santos, Souza, & Fonsêca 22781 (N).

PAEPALANTHUS ARGILLICOLA Alv. Silv., Fl. Mont. 1: 108--110, pl. 67. 1928.

Additional bibliography: Moldenke, Phytologia 20: 357. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971; Moldenke, Phytologia 24: 19. 1972.

PAEPALANTHUS ARGILLICOLA var. PILOSUS Moldenke, Phytologia 24: 19. 1972.

Bibliography: Moldenke, Phytologia 24: 19. 1972.

Citations: BRAZIL: Guanabara: Strang & Castellanos 26305 [Herb. Brad. 49649] (Z--type).

PAEPALANTHUS ARGYROLINON Körn. in Mart., Fl. Bras. 3 (1): 374. 1863.

Additional bibliography: Moldenke, Phytologia 20: 357--358. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 577 & 947. 1971.

PAEPALANTHUS ARGYROPUS Alv. Silv., Fl. Serr. Min. 36. 1908.

Additional bibliography: Moldenke, Phytologia 20: 358--359 & 366. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971.

Irwin and his associates describe the flower-heads of this plant as very light-gray and found the plant growing on campos in areas of cerrado, gallery forest, and campo, at 1050 meters altitude, flowering and fruiting in March. Hatschbach found it on wet campos and in wet sandy soil near rivers, at 1100 meters altitude, flowering and fruiting in August and September.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27034 (Rf), 27335 (Ft), 29992 (Ld); Irwin, Fonsêca, Souza, Reis dos Santos, & Ramos 28083 (N, Rf); Irwin, Reis dos Santos, Souza, & Fonsêca 22020 (N), 22549 (N).

PAEPALANTHUS ARGYROPUS var. BREVIFOLIUS Alv. Silv., Fl. Mont. 1: 22. 1928.

Additional bibliography: Moldenke, Phytologia 20: 359. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 577 & 947. 1971.

PAEPALANTHUS ARGYROPUS var. PUBESCENS Alv. Silv., Fl. Mont. 1: 22. 1928.

Additional bibliography: Moldenke, Phytologia 20: 359 & 366. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 947. 1971.

PAEPALANTHUS ARISTATUS Moldenke, Phytologia 7: 122--123. 1960.

Additional bibliography: Moldenke, *Phytologia* 20: 359. 1970; Moldenke, *Fifth Summ.* 1: 124 (1971) and 2: 635 & 947. 1971.

*PAEPALANTHUS ARMERIA* Mart. ex Körn. in Mart., *Fl. Bras.* 3 (1): 377—378. 1863.

Additional bibliography: Moldenke, *Phytologia* 20: 359—360. 1970; Moldenke, *Fifth Summ.* 1: 158 & 478 (1971) and 2: 577 & 947. 1971.

Irwin & Soderstrom state that this plant is common on wet sandy periodically flooded creekbanks at 700—1000 meters altitude, and found it flowering and fruiting in August.

Additional citations: BRAZIL: Distrito Federal: Irwin & Soderstrom 5825 (N, Rf).

*PAEPALANTHUS ASCENDENS* Alv. Silv., *Fl. Mont.* 1: 237—238, pl. 158. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 360—361. 1970; Moldenke, *Fifth Summ.* 1: 158 (1971) and 2: 947. 1971.

*PAEPALANTHUS ASPER* Alv. Silv., *Fl. Serr. Min.* 64. 1908.

Additional bibliography: Moldenke, *Phytologia* 20: 361. 1970; Moldenke, *Fifth Summ.* 1: 158 (1971) and 2: 947. 1971.

*PAEPALANTHUS ATER* Alv. Silv., *Fl. Mont.* 1: 247—249, pl. 165. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 361—362. 1970; Moldenke, *Fifth Summ.* 1: 158 (1971) and 2: 947. 1971.

Anderson and his associates found this plant growing in "mats on rock" on a mountain summit in an area of shrubby vegetation mostly to 1 meter tall or less, with mossy groundcover in organic soil overlying sandy soil on sandstone rocks, at 2250 meters altitude, flowering in February.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35763 (Ld).

*PAEPALANTHUS ATROVAGINATUS* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 156—157. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 362. 1970; Moldenke, *Fifth Summ.* 1: 158 (1971) and 2: 583 & 947. 1971.

*PAEPALANTHUS AUREUS* Alv. Silv., *Fl. Serr. Min.* 66, pl. 25. 1908.

Additional bibliography: Moldenke, *Phytologia* 20: 362—363. 1970; Moldenke, *Fifth Summ.* 1: 158 (1971) and 2: 577, 578, & 947. 1971.

*PAEPALANTHUS AUYANTEPUIENSIS* Moldenke, *Act. Biol. Venez.* 2: 47—48. 1957.

Additional bibliography: Moldenke, *Phytologia* 20: 363. 1970; Moldenke, *Fifth Summ.* 1: 124 (1971) and 2: 947. 1971.

*PAEPALANTHUS BABYLONIENSIS* Alv. Silv., *Fl. Mont.* 1: 188—189, pl. 121. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 363--364. 1970; Moldenke, *Fifth Summ.* 1: 158 (1971) and 2: 578 & 948. 1971.

*PAEPALANTHUS BAHIENSIS* (Bong.) Kunth, *Enum. Pl.* 3: 517. 1841.

Additional bibliography: Moldenke, *Phytologia* 20: 364. 1970; Moldenke, *Fifth Summ.* 1: 158 & 478 (1971) and 2: 494 & 948. 1971.

*PAEPALANTHUS BALANSAE* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 151--152. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 365. 1970; Moldenke, *Fifth Summ.* 1: 187 (1971) and 2: 590 & 948. 1971.

*PAEPALANTHUS BALANSAE* var. *DENSIFLORUS* Moldenke, *Phytologia* 8: 162. 1962.

Additional bibliography: Moldenke, *Phytologia* 20: 365. 1970; Moldenke, *Fifth Summ.* 1: 158 (1971) and 2: 948. 1971.

*PAEPALANTHUS BARAUNENSIS* Alv. Silv., *Fl. Mont.* 1: 112--113, pl. 70. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 365--366. 1970; Moldenke, *Fifth Summ.* 1: 158 (1971) and 2: 948. 1971.

Irwin and his associates refer to this plant as having inflorescences to 40 cm. tall and the flower-heads white when fresh. They found it growing on campos in a region of campo, cerrado on outcrops, and a wooded valley, at 1200 meters altitude, flowering and fruiting in March.

Citations: BRAZIL: Minas Gerais: Irwin, Fonsêca, Souza, Reis dos Santos, & Ramos 28209 (N, Z).

*PAEPALANTHUS BARBIGER* Alv. Silv., *Fl. Serr. Min.* 47, pl. 16. 1908.

Additional bibliography: Moldenke, *Phytologia* 20: 366. 1970; Moldenke, *Fifth Summ.* 1: 158 (1971) and 2: 578 & 948. 1971.

The Eitens found this plant growing in flat grassy meadows on thin soil derived from itacolomite quartzite, in fine light-gray sand with some humus, and on hillsides with small stones and gravel, at 1200 meters altitude, flowering in November, the flowers described as white. Anderson and his associates describe it as an herb with white flower-heads growing in wet sand in an area of rocky sandstone cerrado and open rocky hillsides with white sandy soil, sloping down to grassy brejo, a creek, and adjacent gallery forest, and in brejo in an area of cerrado and nearly open campo sloping down through brejo to gallery forest, at 1220 meters altitude, flowering in February.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35299 (Ac), 35420 (Ld); Eiten & Eiten 6793 (Ws), 6894 (Rf); Hatschbach, Smith, & Ayensu 28712 (Rf).

*PAEPALANTHUS BARBULATUS* Herzog ex Lützelburg, *Estud. Bot. Nordest.*

3: 148, hyponym (1923) and in Fedde, *Repert. Spec. Nov.* 20: 83--84. 1924.

Additional bibliography: Moldenke, *Phytologia* 20: 366--367.

1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 948. 1971.

*PAEPALANTHUS BARKLEYI* Moldenke, *Phytologia* 3: 114—115. 1949.

Additional bibliography: Moldenke, *Phytologia* 20: 367. 1970; Moldenke, Fifth Summ. 1: 118 (1971) and 2: 948. 1971.

*PAEPALANTHUS BARREIRENSIS* Alv. Silv., *Fl. Mont.* 1: 260—261, pl. 172 [bis]. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 367—368. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 948. 1971.

*PAEPALANTHUS BATATALENSIS* Alv. Silv., *Fl. Mont.* 1: 77—79, pl. 45. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 368. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 948. 1971.

*PAEPALANTHUS BATOCEPHALUS* Ruhl. in Engl., *Pflanzenreich* 13 (4-30): 212. 1903.

Additional bibliography: Moldenke, *Phytologia* 20: 368. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 948. 1971.

*PAEPALANTHUS BELLUS* Moldenke, *Résumé Suppl.* 4: 5, nom. nud. (June 5, 1962) and *Phytologia* 8: 391. December 10, 1962.

Additional bibliography: Moldenke, *Phytologia* 20: 414. 1970; Moldenke, *Biol. Abstr.* 52: 5935. 1971; Hocking, *Excerpt. Bot. A.* 19: 43. 1971; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 578 & 948. 1971.

*PAEPALANTHUS BENEDICTI* Alv. Silv., *Fl. Mont.* 1: 238—240, pl. 159. 1928.

Additional bibliography: Moldenke, *Phytologia* 20: 414. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 948. 1971.

*PAEPALANTHUS BIFIDUS* (Schrader) Kunth, *Enum. Pl.* 3: 512. 1841.

Emended synonymy: *Eriocaulon pygmaeum* Mart., *Flora* 24, Beibl. 2: 60. 1841 [not *E. pygmaeum* Dalz., 1851, nor Körn., 1863, nor Soland., 1809]. *Eriocaulon* (*Paepalanthus*) *pygmaeum* Mart. ex Moldenke, *Phytologia* 20: 414, in syn. 1970.

Additional bibliography: Vittien & Heyn in Pulle, *Fl. Surin.* 1 [Meded. Konink. Ver. Ind. Inst. 30, Afd. Handelsmus. 11]: 216—217. 1938; Moldenke, *Phytologia* 20: 413—419. 1970; Moldenke, Fifth Summ. 1: 103, 118, 124, 130, 132, 134, 142, 158, & 478 (1971) and 2: 492, 494, 496, 500, 509, 516, 518, 578, 582, 589, 590, & 948. 1971.

Irwin and his associates describe this plant as having inflorescences that attain a height of 15 cm., the flower-heads white, and found it forming extensive patches in brown sand of cerrado interspersed with extensive outcrops, at 1175 meters altitude. Davis describes it as a "small forb" with cream-colored flower-heads, growing in open white sand. Prance and his associates encountered it in disturbed caatinga.

Additional citations: GUYANA: D. H. Davis 12 (N). BRAZIL: Amazonas: Prance, Coelho, Maas, & Pinheiro 11658 (Rf). Minas Gerais: Hatschbach, Smith, & Ayensu 28886 (Rf); Irwin, Fonseca, Souza, Reis dos Santos, & Ramos 27648 (N, Rf).

PAEPALANTHUS BIFRONS Alv. Silv., Fl. Mont. 1: 206—207, pl. 136. 1928.

Additional bibliography: Moldenke, Phytologia 20: 419—420. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 948. 1971.

Anderson and his associates encountered what appears to be this species in cerrado in an area of cerrado on rocky hilltops with prominent sandstone outcrops and recently burned campo limpo on lower gentler slopes with sandy soil, and gallery forest along a stream at the base of the hill. They describe the plant as an herb, 1 m. tall, branching into an inflorescence at about 0.7 m. from the base, with the flower-heads white.

Citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 36250 (Z).

PAEPALANTHUS BIFRONS var. FUSCIOR Alv. Silv., Fl. Mont. 1: 207—208. 1928.

Additional bibliography: Moldenke, Phytologia 20: 420. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 578 & 948. 1971.

PAEPALANTHUS BLEPHAROPHORUS (Bong.) Kunth, Enum. Pl. 3: 499. 1841.

Additional bibliography: Moldenke, Phytologia 20: 420—421. 1970; Moldenke, Fifth Summ. 1: 158 & 478 (1971) and 2: 494, 578, & 948. 1971.

PAEPALANTHUS BOMBACINUS Alv. Silv., Fl. Mont. 1: 82—83, pl. 49. 1928.

Additional bibliography: Moldenke, Phytologia 20: 421—422. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 948. 1971.

Anderson and his associates collected this plant on a campo, at 1125 meters altitude, in an area of cerrado on rocky hilltops with prominent sandstone outcrops and recently burned campo limpo on lower gentler slopes with sandy soil, and gallery forest at the base of the hill along a stream, flowering in February.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 36232 (Z).

PAEPALANTHUS BONGARDI Kunth, Enum. Pl. 3: 519. 1841.

Additional bibliography: Moldenke, Phytologia 20: 422—424. 1970; Hocking, Excerpt. Bot. A. 19: 43. 1971; Moldenke, Fifth Summ. 1: 158 & 478 (1971) and 2: 499, 510, 578, 589, & 948. 1971.

PAEPALANTHUS BRACHYPHYLLUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 175. 1903.

Additional bibliography: Moldenke, Phytologia 20: 423 & 424. 1970; Moldenke, Fifth Summ. 1: 158 (1971) and 2: 948. 1971.

It should be noted here that Prain (1908) erroneously cites

the page of the original publication of this binomial as "75" instead of 175.

*PAEPALANTHUS BRACHYPUS* (Bong.) Kunth, Enum. Pl. 3: 516. 1841.

Additional bibliography: Herzog in Fedde, Repert. Spec. Nov. 20: 87. 1924; Moldenke, Phytologia 20: 424--425. 1970; Moldenke, Biol. Abstr. 52: 5935. 1971; Hocking, Excerpt. Bot. A.19: 43. 1971; Moldenke, Fifth Summ. 1: 159 & 478 (1971) and 2: 495, 578, & 948. 1971.

Herzog (1924) avers that his *P. ruhlandii* (now known as *P. herzogii* Moldenke) is closely related to *P. brachypus*, differing in its fewer, short, and almost glabrous leaves.

Anderson and his associates describe *P. brachypus* as growing in clumps from a thick base, the flower-heads white, and found it growing in sandy meadows in an area of rocky sandstone cerrado and open rocky hillsides with white sandy soil, sloping down to grassy brejo, a creek, and adjacent gallery forest, at 1220 m. altitude, flowering in February.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35418a (Id); Hatschbach, Smith, & Ayensu 28972 (Rf); Irwin, Reis dos Santos, Souza, & Fonsêca 21953 (N, Z); A. Lutz 1546 (Ja); Maguire, Maguire, & Murça Pires 44773 (N); Mello Barreto 9381 [Herb. Jard. Bot. Bello Horiz. 25382] (N); L. Riedel 1182 (B--isotype, Br--isotype, N--photo of isotype, S--isotype, Ut--349--isotype, Z--photo of isotype). MOUNTED ILLUSTRATIONS: Ruhl. in Engl., Pflanzenreich 13 (4-30): fig. 25 (B); drawings & notes by Körnicke (B).

*PAEPALANTHUS BRADEI* Moldenke, Phytologia 7: 119--120. 1960.

Bibliography: Moldenke, Phytologia 7: 119--120. 1960; Moldenke, Résumé Suppl. 2: 5 & 15. 1960; Moldenke, Biol. Abstr. 35: 2177. 1960; Hocking, Excerpt. Bot. A.4: 593. 1962; G. Taylor, Ind. Kew. Suppl. 13: 98. 1966; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 948. 1971.

Citations: BRAZIL: Rio de Janeiro: Santos Lima & Brade 14198 [Herb. Jard. Bot. Rio Jan. 25419] (B--type, Z--isotype).

*PAEPALANTHUS BRASILIENSIS* (Mart.) Mart. ex Walp., Ann. Bot. Syst. 1: 890. 1849.

Synonymy: Eriocaulon (Paepalanthus) brasiliense Mart., Flora 24, Beibl. 2: 36. 1841. Paepalanthus (Eriocaulon) brasiliensis Mart. ex Walp., Ann. Bot. Syst. 1: 890. 1849. Eriocaulon brasiliense Mart. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 274 & 333. 1855. Paepalanthus brasiliensis Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 324--325, pl. 44. 1863. Dupatya brasiliensis (Mart.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Paepalanthus brasiliensis Walp. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894. Dupatya brasiliensis Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Eriocaulon brasiliensis Steud. apud Ruhl. in

Engl., Pflanzenreich 13 (4-30): 192, in syn. 1903. Eriocaulon brasiliense Steud. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 285, in syn. 1903.

Bibliography: Mart., Flora 24, Beibl. 2: 36. 1841; Walp., Ann. Bot. Syst. 1: 890. 1849; Steud., Syn. Fl. Glum. 2: [Cyp.] 274, 333, & index. 1855; Körn. in Mart., Fl. Bras. 3 (1): 324-325, 499, & 506, pl. 44. 1863; Kuntze, Rev. Gen. Fl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 (1893) and 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 189, 192, [283], 285, & 289. 1903; Alv. Silv., Fl. Mont. 1: 402. 1928; Stapf, Ind. Lond. 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10, 29, 33, & 45. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 (1946) and 2: 401. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 276-277. 1956; Moldenke, Résumé 95, 279, 286, & 485. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 (1960) and 2: 401. 1960; Moldenke, Fifth Summ. 1: 159 & 478 (1971) and 2: 495, 517, 578, 593, & 948. 1971.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 44. 1863.

The type of this species was collected by Carl Friedrich Philipp von Martius on campos at Arraial d'Água, Minas Gerais, Brazil, and is deposited in the herbarium of the Botanisches Staatssammlung at Munich where it was photographed by Macbride as his type photograph number 18695. Ruhl. (1903) cites only this original collection, but Silveira (1928) cites A. Silveira 679 from Chapado do Couto, Minas Gerais, collected in 1918.

The original description by Martius is (1841): "Eriocaulon (Paepalanthus) brasiliense Mart. glabrescens; caulibus simplicibus (ultrapedalibus), foliis obtusis planiusculis radicalibus rosulatis caule multo brevioribus e latiore basi lanceolatis; caulinis densis appressis minoribus, pedunculis umbellatis pilosis; vaginis glabriusculis. In campis ad Água Suja in Minas novis, Junio. Oreas. Affine praecipue E. rigido et polyantho; ab illo diversum foliis tenuioribus latioribus, caulinis obtusioribus, tomento inter folia brevior albo nec testaceo, ab hoc foliis radicalibus multo brevioribus, angustioribus: - ad E. ciliato quoque foliis obtusioribus, brevioribus facile distinguitur."

The species has been collected in anthesis in June.

Citations: BRAZIL: Minas Gerais: Martius s.n. [Arraial d'Água Suja; Macbride photos 18695] (N—photo of type, W—photo of type); Mendes Magalhães 2075 [Herb. Jard. Bot. Belo Horiz. 42250] (N).

PAEPALANTHUS BREVICAULIS Alv. Silv., Fl. Mont. 1: 28-29, pl. 12. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 28-29 & 402, pl. 12. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind.

Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 948. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 12. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 705) in sandy fields in the Serra da Moeda, Minas Gerais, Brazil, in August of 1926, and is deposited in the Silveira herbarium. On page 402 of his work Silveira (1928) cites this same herbarium number as having been collected in 1908. It is not clear to me if this is an error or is meant to be a correction of the date given on page 29, or even if there is a second collection involved here. The species has not otherwise been collected as far as I am aware.

PAEPALANTHUS BRITTONI Moldenke, Known Geogr. Distrib. Erioc. 51, nom. nud. (February 9, 1946) and Phytologia 2: 140. July 8, 1946.

Synonymy: Dupatya montana Britton, Bull. Torrey Bot. Club 44: 33. 1917. Paepalanthus montanus (Britton) Moldenke, Revist. Sudam. Bot. 4: 17. 1937 [not P. montanus Alv. Silv., 1928]. Paepalanthus brittonii Moldenke ex Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969.

Bibliography: N. L. Britton, Bull. Torrey Bot. Club 44: 33. 1917; A. W. Hill, Ind. Kew. Suppl. 6: 72. 1926; Moldenke, Revist. Sudam. Bot. 4: 17. 1937; Moldenke, N. Am. Fl. 19: 43. 1937; Moldenke, Phytologia 1: 333-334 (1939) and 2: 140. 1946; Moldenke, Known Geogr. Distrib. Erioc. 5, 45, & 51. 1946; Moldenke, Alph. List Cit. 1: 75 & 185. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 158. 1947; Moldenke, Phytologia 2: 140. 1948; Moldenke, Alph. List Cit. 2: 569 & 649 (1948), 3: 929 (1949), and 4: 1191 & 1257. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 44 & 208. 1949; Moldenke, Phytologia 4: 136 (1952) and 4: 200. 1953; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Alain, Revist. Soc. Cub. Bot. 13: 38. 1956; Conde, Hist. Bot. Cub. 221. 1958; Moldenke, Résumé 52, 326, & 485. 1959; Moldenke, Résumé Suppl. 18: 9. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 184, 186-188, & 191. 1969; Moldenke, Fifth Summ. 1: 97 & 483 (1971) and 2: 578, 586, & 948. 1971.

The type of this species was collected by John Adolf Shafer (no. 4473) on compact red iron ore along the trail from Río Yamanigüey to Camp Toa, at an altitude of 400 meters, Oriente, Cuba, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species is obviously closely related to P. pungens Griseb.

Marie-Victorin & Clément found this plant growing in association with Anastrophia victorinii. Ekman 2341 is a mixture with P. pungens Griseb. and P. pungens var. brevifolius Moldenke.

The two isotypes of P. brittoni cited by me in Phytologia 1: 334 (1939) as deposited in the Britton Herbarium are now in the

herbaria of Cornell University and of the Museo de Historia Natural at Montevideo, respectively.

The Paepalanthus montanus Alv. Silv., referred to in the synonymy above, is a valid Brazilian species.

Additional citations: CUBA: Oriente: Acuffa & López Figueiras 5881 (Z); Ekman 2341, in part (S), 3522 (S), 3835 (S); R. A. Howard 5960 (Ca—913754); León & Marie-Victorin 20149 (Um—9318); Marie-Victorin & Clément 21834 (Um—25325, Um—25366, Um—25367); Marie-Victorin, Clément, & Alain 21834 (Vi).

PAEPALANTHUS BROMELIOIDES Alv. Silv., Fl. Serr. Min. 55, pl. 18. 1908.

Bibliography: Alv. Silv., Fl. Serr. Min. 55, pl. 18. 1908; Alv. Silv., Fl. Mont. 1: 225--227 & 402, pl. 149. 1928; Stapf, Ind. Lond. 4: 518. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Phytologia 4: 136. 1952; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234 & 266--267. 1956; Moldenke, Résumé 95 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146]. 1969; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 948. 1971.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 18. 1908; Alv. Silv., Fl. Mont. 1: pl. 149. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 361) in dry sandy fields in the Serra do Cipó, Minas Gerais, Brazil, and is deposited in the Silveira herbarium. Silveira (1908) notes that "Haec species inter illas quae habent caulem brevem est maxima". It is, however, certainly closely related to P. corymbosus (Bong.) Kunth and P. lanceolatus Körn.

Recent collectors describe the plant as an acaulescent herb growing in clumps or large tufts, caespitose, the inflorescences to 25 cm. tall, and the flower-heads light gray-brown, light-gray, "light-gray around the edges, white in the center", or white, and have found it growing on steep rocky slopes, in crevices on steep iron-rich rocky slopes, on campos in areas of cerrado, sedge meadows (brejo), sandstone outcrops, and gallery forest, on campos in areas of forest along streams, adjacent rocky and grassy hillsides, and grassy campo on top of hills, in sandy soil with sandstone, and "common on rocky knolls with very fine sand which is light-gray because of a small humus content", at altitudes of 120 to 2000 meters, flowering from November to February and April to September, fruiting in November.

Material has been misidentified and distributed in herbaria as P. lanceolatus Körn. The Irwin, Maxwell, & Wasshausen 20031, cited below, is a mixture with P. plumipes Alv. Silv.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 36092 (Id); Archer 3674 (N, W—1705661); Eiten & Eiten 6784 (Rf); Hatschbach, Smith, & Ayensu 28714 (Rf); Heringer

6097 (N); Irwin, Harley, & Onishi 29030 (Ld), 30225 (Ac); Irwin, Maxwell, & Wasshausen 19619 (N, Rf), 20031, in part (N); Macedo 2975 (N, S); Maguire, Maguire, & Murça Pires 44680 (N, N), 44709 (N); Mello Barreto 1040 [Herb. Brad. 14473; Herb. Jard. Bot. Rio Jan. 28459] (B), 2478 (N), 2479 [Herb. Jard. Bot. Belo Horiz. 7889; Herb. U. S. Nat. Arb. 236398] (W--2109984), 2482 (N); Murça Pires & Black 2794 (Be--63250), 2906 (Be--63461); A. Silveira 361 (B--isotype); L. B. Smith 6835 (Z); Tryon & Tryon 6823 (Z); J. Vidal II.6105 (Ca--1169483).

*PAEPALANTHUS BRUNNESCENS* Ruhl. in Engl., Pflanzenreich 13 (4-30): 136. 1903.

Synonymy: *Paepalanthus brunescens* Ruhl. ex Rennó, Levant. Herb. Inst. Agron. 69, sphalm. 1960.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 125, 136, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 106. 1928; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Résumé Suppl. 3: 34. 1962; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 578 & 948. 1971.

This species is based on Glaziou 19984 from Biribiry, Minas Gerais, Brazil, collected in flower in March and deposited in the herbarium of the Botanisches Museum at Berlin, where it was photographed by Macbride as his type photograph number 10575. Ruhland (1903) says "Species praesertim bractearum involucrantium colore et consistentia insignis, habitu *P. plantagineo* Koern. similis, caespitose crescens". Hatschbach found it "das anfratuosidades, dos paredões rochosos", flowering and fruiting in August.

Citations: BRAZIL: Minas Gerais: Glaziou 19984 [Macbride photos 10575] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype); Hatschbach 30079 (Ld); Lutz & Lutz 26 [Herb. Lutz 1642] (Z); Mendes Magalhães 535 [Herb. Jard. Not. Belo. Horiz. 34383] (N).

*PAEPALANTHUS BRUNNEUS* Moldenke, Phytologia 2: 379, nom. nud. (1947) and in Maguire, Bull. Torrey Bot. Club 75: 195--196. 1948.

Bibliography: Moldenke, Phytologia 2: 379. 1947; Moldenke in Maguire, Bull. Torrey Bot. Club 75: 195--196. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 66 & 208. 1949; Moldenke, Alph. List Cit. 3: 701. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Résumé 75 & 485. 1959; Moldenke, Résumé Suppl. 4: 5. 1962; Moldenke, Phytologia 20: 297 & 346. 1970; Moldenke, Fifth Summ. 1: 124 & 130 (1971) and 2: 948. 1971.

This species is based on Maguire & Fanshawe 23020, said to have been "locally common", chiefly on white sand in secondary scrub forest at Amatuk Portage, Potaro River Gorge, Guyana, collected on April 27, 1944, deposited in the Britton Herbarium at the New York Botanical Garden, and described by the collectors as an erect

annual, to 10 cm. tall. Whitton says of it "a rarer plant than [no.] 13 [P. fasciculatus (Rottb.) Kunth] and probably of moister places; herb with basal rosettes of bright green leaves; fruiting heads of one specimen taken have seeds germinating", and found it growing in wet sandy ground in the open. Cowan & Soderstrom refer to it as a "frequent herb in boggy patches atop rocks in constant mist from falls", with dark-gray flower-heads, at an altitude of 700 feet, flowering in March. The species resembles Eriocaulon caesium Griseb. in general habit.

Citations: VENEZUELA: Bolivar: J. A. Stayermark 90718 (Z). GUY-ANA: Cowan & Soderstrom 2153 (Fg); Maguire & Fanshawe 23020 (N-type); Whitton 68 (K).

PAEPALANTHUS BRYOIDES (Riedel) Kunth, Enum. Pl. 3: 520. 1841.

Synonymy: Eriocaulon bryoides Riedel ex Bong., Ess. Monog. Erioc. 24. 1831. Eriocaulon bryoides Riedel & Bong. ex Steud., Nom. Bot., ed. 2, 1: 585. 1840. Eriocaulon bryoides Bong. ex D. Dietr., Syn. Pl. 5: 261. 1852. Paepalanthus bryoides Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 277 & 351. 1863. Dupatya bryodes (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Eriocaulon bryodes Bong. ex Kuntze, Rev. Gen. Pl. 2: 745, in syn. 1891. Dupatya bryodes Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Dupatya bryoides Kuntze apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 159, in syn. 1903. Syngonanthus brioides (Bong.) Kunth ex Rennó, Levant. Herb. Inst. Agron. 71. 1960.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 624 & 625, pl. 10 [sup.]. 1831; Bong., Ess. Monog. Erioc. 24 & 52-53, pl. 10 [sup.]. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 520, 572, 573, 612, & 624. 1841; D. Dietr., Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 276 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 277, 351-352, 507, & 508. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 (1893) and 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 158-159, 162, [283], 285, & 289. 1903; Alv. Silv., Fl. Mont. 1: 402. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10, 29, 33, & 45. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 (1946) and 2: 401. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Alph. List Cit. 3: 855. 1949; Moldenke, Phytologia 4: 136-137. 1952; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 276-277. 1956; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 95, 279, 286, 323, & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69 & 71. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 (1960) and 2: 401. 1960; Moldenke, Résumé Suppl. 3: 35 (1962), 17: 9 (1968), and 18: 9. 1969; Moldenke, Phytologia 20: 340 & 357. 1970; Moldenke, Fifth Summ. 1: 159 & 478 (1971) and 2: 495, 578, 635, & 948. 1971.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6,

1: pl. 10 [sup.]. 1831; Bong., Ess. Monog. Erioc. pl. 10 [sup.]. 1831.

This species is based on L. Riedel 1416, collected in shady places in the Serra da Lapa, Minas Gerais, Brazil, flowering in November, and deposited in the Leningrad herbarium. Bongard's original (1831) description reads "exiguum; cauliculis confertis ramosis dense foliosis; foliis linearibus acuminatis pilosiusculis; pedunculis terminalibus fasciculatis pubescentibus; vaginis bifidis. Tab. X. E. bryoides Riedel MS. Habitat in rupibus, locis Serra da Lapa. Floret Novembri. ☉." Ruhland (1903) cites Glaziov 19987 & 19989, L. Riedel 1416, and Schwacke 8486, all from Minas Gerais and deposited in the Berlin herbarium; Silveira (1928) cites A. Silveira 234 from Diamantina, Minas Gerais, collected in 1908.

Kunth (1841) comments "Conf. cum P. congesto, perpusillo et fasciculato" [these taxa are now known as P. fasciculatus (Rottb.) Kunth, P. perpusillus Kunth, and P. bifidus (Schrad.) Kunth respectively]. Actually, P. bryoides is in habit most confusingly similar to Blastocaulon rupestre (G. Gardn.) Ruhl. and the Schwacke 8485 & 8486 collections have each been cited under both of these taxa! Possibly material of both taxa was accidentally placed in each of these consecutive numbers in the distribution by Schwacke. Ruhland notes (1903) "Ramificatione speciebus generis Blastocauli Ruhl. similis".

Bongard's illustration of Paepalanthus bryoides is often cited as plate 10, "fig. 1", and, in fact, is so referred to in the text of at least the reprint of his work. However, plate 10 (in at least the reprint) consists of an upper and a lower series of drawings. Only the upper set, labeled fig. 1--7, depicts P. bryoides. The lower set, labeled fig. 1--6, depicts Philodice cuyabensis (Bong.) Körn. I am therefore referring to the former as "pl. 10 [sup.]" and the latter as "pl. 10 [inf.]".

It is worth noting here that Bongard (1831) credits the binomial, Eriocaulon bryoides, to Riedel on page 24 of his reprint work, but gives no authority for it on pages 52--53 and on pl. 10 [sup.]; Kunth (1841) credits it to Riedel in his Enum. Pl. 3: 612, in syn.; Steudel (1855) credits it to Bongard on page 276 of his work, but to Riedel on page 333; Ruhland (1903) accredits it to Bongard.

Collectors have found Paepalanthus bryoides growing on campos, at altitudes of 900--1300 meters, flowering in September and from November to March. Irwin and his associates found it "forming mats beneath overhanging rocks in ravine with steep rocky walls", "in sandy cerrado and thickets with sandy pockets in outcrops", and "in shade of overhanging rocks on gallery margin" in an area of "cerrado on outcrops, brejo, and gallery forest". Anderson and his associates describe it as "forming a mess-like mat on sandstone shelves beneath protecting overhang" in an area of steep

rocky hillsides below sandstone cliffs, a stream at the base of the hills, and recently burned cerrado between the hills, and "forming a mat in dry sandy soil under an overhang" in a valley with very steep rocky sandstone sides sloping down to gallery forest, with sedge meadow (brejo) in places just above the forest.

The flower-heads are described as white or light gray-brown by collectors in the field. Brade 13604 gives evidence of the leaves and inflorescences having been tufted toward the ends of very long slender leafless stems, while Irwin and his associates state definitely that the stems ascend to a height of 20 cm.

Material has been misidentified and distributed in some herbaria under the names Blastocaulon rupestre (G. Gardn.) Ruhl. and Syngonanthus rupestris (Gardn.) Ruhl. On the other hand, the Williams & Assis 5798 & 6636, distributed as Paepalanthus bryoides, are both P. argillicola Alv. Silv.

Additional citations: BRAZIL: Minas Gerais: Anderson, Stieber, & Kirkbride 35232 (Ld), 35643 (Ac); Brade 13604 [Herb. Jard. Bot. Rio Jan. 25382] (B); Glaziou 19987 (Br, N, W-1112517), 19989 (Br, N); Hatschbach 27447 (Ft); Irwin, Fonsêca, Souza, Reis dos Santos, & Ramos 28578 (Ac, N); Irwin, Reis dos Santos, Souza, & Fonsêca 22303 (N, Z), 22694 (N, Rf); Mello Barreto 10129 [Herb. Jard. Bot. Belo Horiz. 24419] (N); L. Riedel 1416 (B--isotype, Br--isotype, N--photo of isotype, S--isotype, Ut--350--isotype, Z--photo of isotype); Schwacke 8485 [Herb. Jard. Bot. Belo Horiz. 26667], in part (N). Santa Catarina: Smith & Klein 13760 (W-2451595); Smith & Reitz 9881 (Ac). MOUNTED ILLUSTRATIONS: drawings & notes by Körnigke (B).

PAEPALANTHUS BULBOSUS Alv. Silv., Fl. Mont. 1: 184-186, pl. 119. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 184-186 & 403, pl. 119. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 948. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 119. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 784) in sandy fields between Diamantina and Serro, in the Serra Geral, Minas Gerais, Brazil, in June of 1925, and is deposited in the Silveira herbarium. On page 403 of his work (1928) Silveira gives the year of collection of the type as "1926" -- whether this is meant to be a correction of the date given in the original description, or is merely an error, is not clear. He comments that "Species a P. hemigloboso Alv. Silv. bracteis involucrentibus dorso fere glabris, caule robustiore, foliis majoribus et aliis characteribus distinctissima". Thus far, P. bulbosus is known only from the original collection.

*PAEPALANTHUS CABRALENSIS* Alv. Silv., Fl. Mont. 1: 220—222, pl. 146. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 220—222 & 403, pl. 146. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 293. 1956; Moldenke, Résumé 95 & 485. 1959; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 948. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 146. 1928.

This species is based on A. Silveira 592, collected "In pratis siccis per tota Serra do Cabral", Minas Gerais, Brazil, and is deposited in the Silveira herbarium. Silveira (1928) comments that "A. P. stereophyllo Ruhl. proximus, sed foliis caulinis, pilis bractearum perigoniorumque, pedunculis minoribus etc. distincta". It seem to me that it is also very similar to P. denudatus Körn. and P. nudus Alv. Silv.

Citations: BRAZIL: Minas Gerais: Mendes Magalhães 48277 (Z).

*PAEPALANTHUS CACHAMBUENSIS* Alv. Silv., Fl. Mont. 1: 50—52, pl. 27. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 50—52 & 403, pl. 27. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Phytologia 4: 137. 1952; Moldenke, Résumé 96 & 485. 1959; Renné, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Phytologia 20: 303. 1970; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 948. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 27. 1928.

This species is based on A. Silveira 641 from dry fields in the Morro do Cachambu [Caxambu], Minas Gerais, Brazil, collected in November of 1916 and deposited in the Silveira herbarium. The species bears great habitat similarity to P. aequalis (Vell.) J. F. Macbr. Material has been misidentified and distributed in some herbaria under the name Eriocaulon paludosum Bong.

Additional citations: BRAZIL: Minas Gerais: Andrade 1225 [Emmerich 1186] (Bd—16652); P. Clausen 37 (P), s.n. (Br); Mello Barreto 2563 [Herb. Jard. Bot. Belo Horiz. 4052] (N), 2566 [Herb. Jard. Bot. Belo Horiz. 10697] (N), 5083 [Herb. Jard. Bot. Belo Horiz. 14217] (N); Williams & Assis 7489 (Ca—744426).

*PAEPALANTHUS CACUMINIS* Ruhl. in Engl., Pflanzenreich 13 (4-30): 205. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 205, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 96 & 485. 1959; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 948. 1971.

The type of this species was collected by E. B. Sena in wet

sandy soil at the summit of the Serra da Cachoeira do Campo, at 1500 meters altitude, Minas Gerais, Brazil, flowering in April and deposited in the herbarium of the Botanisches Museum at Berlin, where it was photographed by Macbride as his type photograph number 10576. Ruhland (1903) comments that the "Species foliis pro ratione brevibus, longissime et persistenter ciliatis distincta". Thus far, as far as I know, this taxon is known only from the original collection.

Citations: BRAZIL: Minas Gerais: Sena s.n. [Herb. Schwacke 14405; Macbride photo 10576] (B—type, N—photo of type, N—photo of type, W—photo of type, Z—isotype).

PAEPALANTHUS CAESPITITIUS Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 365. 1863.

Synonymy: Eriocaulon kummerianum Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 365, in syn. 1863. Paepalanthus caespiticius Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 507, sphalm. 1863. Dupatya caespititia (Mart.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya caespititia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 365 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 401. 1894; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3): no. 11: 29. 1901; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 124, 132, [283], 284, & 286. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10, 29, 36, & 45. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 401. 1946; Moldenke, Alph. List Cit. 2: 413 (1948) and 3: 855. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Phytologia 4: 137. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 96, 279, 289, & 485. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 401. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 173, 174, & 189. 1969; Moldenke, Fifth Summ. 1: 159 & 478 (1971) and 2: 504, 578, & 948. 1971.

This species was based by Körnicke on two collections: (1) P. Clausen 166 and (2) Martius 1082, both from Cachoeira do Campo, Minas Gerais, Brazil, and deposited in the Berlin Herbarium, where the latter was photographed by Macbride as his type photograph number 10577. Martius 1082 is also the type collection of Eriocaulon kummerianum Mart., deposited in the herbarium of the Naturhistorisches Museum at Vienna. Ruhland (1903) cites only the two original cotype collections and comments that the "Species foliorum facie statim dignoscenda".

Citations: BRAZIL: Minas Gerais: P. Clausen 166 (Br—cotype), s.n. [1840] (S); Martius 1082 [Macbride photo 10577] (B—cotype, N—photo of cotype, N—photo of cotype, S—cotype, W—photo of cotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

*PAEPALANTHUS CALDENSIS* Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 29--30, pl. 2, fig. 2. 1901.

Synonymy: *Paepalanthus decipiens* Ruhl. in Engl., Pflanzenreich 13 (4-30): 135. 1903. *Paepalanthus ruhlandii* Alv. Silv. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 159--160. 1903. *Paepalanthus dusenii* Ruhl. ex Moldenke, Known Geogr. Distrib. Erioc. 12 & 47, nom. nud. 1946. *Paepalanthus caldense* Malme ex Rambo, Sellowia 8: 283, sphalm. 1956. *Paepalanthus tortilis* var. *albidus* Ruhl. ex Moldenke, Fifth Summ. 2: 591, in syn. 1971.

Bibliography: Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 29--30, pl. 2, fig. 2. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 124, 135, 152, 159--160, 222, 289, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 102, 118--120, 405, & 412, pl. 74. 1928; Stapf, Ind. Lond. 4: 518. 1930; A. W. Hill, Ind. Kew. Suppl. 9: 200. 1938; Worsdell, Ind. Lond. Suppl. 2: 183 & 184. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10--12, 15, 46, 47, & 53. 1946; Moldenke, Phytologia 2: 374. 1947; Moldenke, Alph. List Cit. 2: 448 (1948), 3: 969 (1949), and 4: 1287. 1949; Rambo, An. Bot. Herb. Barb. Rodr. 1: 128. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82, 83, 87, 208, 209, & 211. 1949; Moldenke, Phytologia 3: 142 (1949), 4: 137 (1952), and 4: 200. 1953; Rambo, Sellowia 7: 248 & 283. 1956; Reitz, Sellowia 7: 124. 1956; Rambo, Sellowia 8: 283. 1956; Angely, Fl. Paran. 10: 5 & 14. 1957; Moldenke, Résumé 96, 97, 324, 328, 485, & 486. 1959; Reitz, Sellowia 11: 31 & 119. 1959; Moldenke, Résumé Suppl. 1: 6, 20, & 25. 1959; Angely, Fl. Paran. 16: 66 (1960) and 17: 24. 1961; Angely, Fl. Anal. Paran., ed. 1, 200. 1965; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969; Reitz, Sellowia 22: 104. 1970; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 581, 590, 591, & 948. 1971.

Illustrations: Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: pl. 2, fig. 2. 1901.

This species was based by Malme on a series of specimens, all of which must be regarded as cotypes, all collected in Minas Gerais, Brazil, and all deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm: Mosén 764, 765, 1054, 1055, & 4449, Regnell III.1268, and Widgren s.n. *Paepalanthus ruhlandii* was based on (1) "E. F. Sacupahy ex Alvaro Silveira in Herb. Comm. geol. e geogr. de Minas, n. 2941" from brooksides at Maria de Fé, Minas Gerais, collected in November of 1899 and (2) E. Ule 1620 from marshes on the campos of Serra do Oratorio, Santa Catarina, Brazil, collected in January of 1890, both deposited in the Berlin herbarium. *Paepalanthus decipiens* was based on Glaziou 7996 from Campos da Bocaina, near Cascatinha, São Paulo, Brazil, also deposited in the Berlin herbarium where it was photographed by Macbride as his type photograph number 10594. *Paepalanthus dusenii* appears to have been based on Dusen s.n. [21.10.1908] and Jönsson 123a in the Stockholm herbarium, both from Paraná, the latter photographed in the Berlin herbarium by Macbride as his type photo-

graph number 25165. Ruhland's P. tortilis var. albidus was based on Ule 1620 in the herbarium of the Botanisches Museum at Hamburg. It should be noted here that the later homonym, P. caldensis Alv. Silv., is a synonym of P. neocaldensis Moldenke.

Malme's original publication of this taxon is sometimes erroneously cited as "vol. 27 (3), no. 2" or "vol. 28 (11)".

Collectors have found this species growing in marshes and swamps, along brooks, and on boggy river margins, at altitudes of 700 to 1900 meters, flowering from October to January and in April, and fruiting in November. Vernacular names recorded for it are the inclusive "capim manso", "capipoetinga", "gravatá manso", and "sempreviva do campo". Ruhland cites for what he regarded as true P. caldensis only the cotypes, Mosén 764, 1054, 1055, & 4449, Regnell III.1269, and Widgren s.n., all from Minas Gerais, and comments "Species P. neglecto Koern. affinis esse dicitur; ex descriptione cl. Malmei P. decipienti Ruhl. proxima". For what he called P. ruhlandii he cites only the two cotypes and notes "Species habitu P. tortili Mart. subsimilis, sed vix affinis. Folia, pili, perigonia insignia. Specimina a cl. Silveira collecta Uleanis multo validiora." For what he calls P. decipiens he cites only the type collection and notes "Species habitu et pilis florum a praecedente [P. diplobetor Ruhl.] et sequente [P. freyreisii (Thunb.) Körn.] aliena". Silveira (1928), in his discussion of P. ruhlandii, cites only one collection: "Secus margines rivulorum prope Maria da Fé, Minas Geraes: Alvaro da Silveira, Nov. 1899; n. 235 in herbario Silveira", and comments "Species a cl. Ule, in locis paludosis, in S. Catharina, lecta. A P. tortili Mar. affinis, sed foliis, pilis et perigonio praecipue distincta". For P. decipiens he cites G. Edwall s.n. from the Serra da Mantiqueira, collected in 1922.

Additional citations: BRAZIL: Minas Gerais: Mosén 764 [30/10/1873] (N—photo of cotype, S—cotype, S—cotype, Z—photo of cotype), 765 [5/10/1873] (S—cotype), 1054 [1/12/1873] (Er—cotype, S—cotype, S—cotype), 1055 [20/11/1873] (S—cotype, S—cotype), 4449 [5/11/1875] (S—cotype, S—cotype); Regnell III.1268 [26/11/1864] (S), III.1268 [10/1/1874] (S—cotype, S—cotype, W—200763—cotype); A. Silveira 2941 (B); Ule 232, in part [Herb. Mus. Nac. Rio Jan. 29526] (N, N, S); Widgren s.n. [1845] (S—cotype). Paraná: Braga 1503 (W—2369355); Dombrowski 1899 [Kuniyoshi 1635] (Ac), 2039 [Kuniyoshi 1765] (Rf); Dombrowski & Saito 559/348 (Ac), 1032/849 (Ac); Dusén 2519 (S), 15620 (B, Br, S, W—1280827), s.n. [10.12.1903] (B), s.n. [21.10.1908] (B, S, S); Hatschbach 1555 (N), 2065 (N), 3192 (Z), 17744 (Ac), 22523 (N), 25342 (Ft), 27143 (Ac), 27660 (Ac), 28557 (Rf); Jönssen 123a [Macbride photos 25165] (B, N, N—photo, S, W—1470430, W—photo); Mattos 4748 (N); E. A. Moreira 74 [Herb. Inst. Hist. Nat. 6292] (W—2369339), 90 [Herb.

Inst. Hist. Nat. 6288] (W—2369341); E. Pereira 5182 (Bd—13346); Stellfeld 1064 (N); Tessmann 3071 (N), 3784 (N). Rio de Janeiro: Dusén s.n. [Rio de Janeiro, 1905] (S). Rio Grande do Norte: A. Lutz 1345 (Ja). Rio Grande do Sul: Bornmüller 758 (V); O. Camargo 62448 (S); Dutra s.n. [Martio 1936] (S); Emrich & Rambo 36784 (N); Rambo 30965 (N, N), 34684 (S), 49400 (Lm, N, S), 51541 (S). Santa Catarina: Pabst 6184 [E. Pereira 6357; Herb. Brad. 21961] (Lw); Reitz 1975 (N, S), 2695 (N), 3429 (S), C.1975 (S); Smith & Klein 7463 (N, Ok), 8203 (Ok), 10849 (Ok), 11001 (Ok), 13573 (Ac, N), 13979 (Ac); Smith & Reitz 8680 (Ok), 8979 (Ok), 9071 (Ok), 9882 (Ok), 14212 (Ac), 14322 (Ac); Smith, Reitz, & Klein 7682 (Ok); Ule 1620 (B, Hg, N—photo). São Paulo: Glaziov 7996 [Macbride photos 10594] (B, N—photo, N—photo, W—photo); Leite 3362 (N); Pabst 4837 (Bd—11044); Segadas-Vianna 2944 [Lev. Fito-sociol. 510401-0102] (Ja), 3074 (Ja).

*PAEPALANTHUS CALLOCEPHALUS* Alv. Silv., Fl. Mont. 1: 29—31, pl. 13. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 29—32 & 403, pl. 13. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 46. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 96 & 485. 1959; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 948. 1971.

The type and only known collection of this species in its typical form was made by Álvaro Adolpho da Silveira (no. 709) in sandy fields between Serro and Diamantina, in the Serra Geral, Minas Gerais, Brazil, in June of 1925 and is deposited in the Silveira herbarium. Silveira (1928) cites "Tabula XIII" for this taxon, but that plate actually depicts var. villosus Alv. Silv. He comments that the "Species indumento valde variabile praedita".

*PAEPALANTHUS CALLOCEPHALUS* var. *CILIATUS* Alv. Silv., Fl. Mont. 1: 31—32 [as "ciliata"]. 1928.

Synonymy: Paepalanthus callocephalus var. ciliata Alv. Silv., Fl. Mont. 1: 31. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 31—32 & 403. 1928; Moldenke, Known Geogr. Distrib. Erioc. 10 & 46. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 96, 323, & 485—486. 1959; Moldenke, Fifth Summ. 1: 159 (1971) and 2: 579 & 948. 1971.

This variety is based on A. Silveira 749, collected in sandy places in the Serra do Chapadão near the Serra da Canastra, Minas Gerais, Brazil, in April of 1925, and is deposited in the Silveira herbarium. Silveira (1928), on page 403 of his work, cites the same collection number 749 as having been gathered at Chapada do Couto in 1918. Whether this is an error, or is intended as a correction of the data given with the original description, or the record of a second collection under the same number, is not clear.

[to be continued]

## BOOK REVIEWS

Alma L. Moldenke

"THE WORLD WILDLIFE GUIDE" edited by Malcolm Ross-Macdonald, 416 pp., illus., The Viking Press, New York, N. Y. 10022. [1971] 1972. \$8.95.

This is a really useful and valuable "complete handbook covering all the world's outstanding national parks, reserves, and sanctuaries," covering 649 sites from all continents, including about 200 within the United States, listing plant and animal life, accommodations, routes, admissions, guides, maps and much additional pertinent data not found in the usual "touristy" guides. The work is well illustrated with black/white nature photographs and is published in association with the World Wildlife Fund and with introductory essays by outstanding naturalists.

The book is so compact that it will carry well on trips, and it will be well worth the carrying because of all the useful and well organized information crammed into it.

"ROCKY MOUNTAIN FLORA — A Field Guide for the Identification of the Ferns, Conifers, and Flowering Plants of the Southern Rocky Mountains from Pike's Peak to Rocky Mountain National Park and from the Plains to the Continental Divide" by William A. Weber, viii & 438 pp., illus., Colorado Associated University Press, Boulder, Colorado 80302. 1972 Revised Field Edition. \$7.95 text edition. \$8.95 trade edition.

In the summer of 1938 I came, I saw and I was unforgettably conquered by this -- my first -- national park and its ranger naturalists. How I would have loved to have had this excellent guide for its workable keys, fine line illustrations, exquisite color plates and pocket size rather than just the few-paged pamphlets available then.

This flora of about 1575 species from the "frontal range" covers more than half of the total for the state of Colorado. Because of the general similarity of the flora this guide can be used for most of the state, for contiguous Wyoming and for contiguous New Mexico. It covers plant zones from plains to alpine tundra at 14,000 feet and distribution types that are: Rocky Mountain, Asiatic, Tertiary relicts, eastern woodland-prairie, circumboreal, eastern Mediterranean weeds and local endemics. The Verbena hastata listed is more probably V. hastata var. scabra Moldenke.

"HIDDEN VALLEY OF THE SMOKIES — With a Naturalist in the Great Smoky Mountains" by Ross E. Hutchins, ix & 214 pp., illus., Dodd, Mead & Co., New York, N. Y. 10016. 1971. \$6.50

"It is a place for the inquiring mind, a place to marvel at primitive beauty, seeing nature firsthand in a wild setting. This is the place I call Hidden Valley and I invite you to share my excursions through its shadowy forests and to listen with me to the music of its murmuring streams." Then this naturalist-photographer-entomologist-author describes the site in exquisite detail, its incomparable forest, a springtime walk, leaves in the sun, the waterfall, Cucumber Gap, autumn on the trail, mushroom glen, stories of the poisons and the uses of the plants, and the geological formation of the area. The writing style is pleasant and easy flowing. The work is copiously illustrated with the author's excellent photographs.

Some, not all, of the scientific names are given. Adiantum on p. 105, and Lactarius on p. 154, are misspelled. The work is indexed.

"PASSPORT TO NATURE" by William A. Damroth and Introduction by Arthur Godfrey, 96 pp., illus., The Viking Press, New York, N. Y. 10022. 1972. \$10.00.

This is a Studio Book of exquisite photographic plates and of effectively expressed ideas about the nature, value and necessity of preserving the few remaining natural life wonders of our earth. Both of these men are now dedicated part-time conservationists who came from well-known different backgrounds. Would that more of our ignorantly and/or wilfully destructive citizens would spend quietly at least two hours with this book!

"MANUAL OF VEGETATION ANALYSIS" by Stanley A. Cain & G. M. Oliveira Castro, xvii & 325 pp., illus., Facsimile of the 1959 edition. Hafner Publishing Co., New York, N. Y. 10022. 1971. \$12.00.

Particularly because of all the present-day research in ecology, it is indeed good to have this now classic, but limitedly accessible, study readily available again. All the original considerable advantages and few minor disadvantages -- such as an only superficial index, misspellings of Ranunculaceae on p. 230 and the specific name for Vitex triflora on pp. 278 & 279 -- are retained intact.

The book deals with: (1) floristics, (2) synusial structure of vegetation in the plant community, (3) major vegetation types with an excellent analysis of the tropical rain forest, (4) problems of number (abundance and diversity), of pattern (frequency à la Raunkiaer) and of dominance (measurements and descriptions of coverage and combinations of community characteristics), (5) concepts important in synthesis (constancy, fidelity, exclusiveness) and (6) life-form and leaf-shape à la Raunkiaer.

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# PHYTOLOGIA

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## ERIOGONUM (POLYGONACEAE) OF UTAH

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&

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At the request of Dr. Stanley L. Welsh of Brigham Young University, Provo, Utah, I have prepared a treatment of the genus *Eriogonum* (Polygonaceae) for a new addition of his book **Common Utah Plants**. As this review is for a student oriented publication and no new names or combinations can be easily published therein, I am submitting a formal paper reviewing the genus in Utah and making the necessary name changes. It is hoped too, that this publication will be of use to the more "professional" taxonomist who would like species descriptions and synonymies - a feature not included in Welsh's format. The style of presentation given here follows that used by Reveal and Munz (1968) in a review of the genus for the California flora.

### *Eriogonum* Michx. Wild Buckwheat

Annual or perennial herbs and shrubs with basal or cauline, alternate leaves and often with alternate or whorled scale-like to foliaceous bracts, entire and estipitate; flowers perfect or imperfect, borne in campanulate to turbinate or cylindric involucre, 4-10-lobed or toothed or rarely composed of two whorls of 3 lobes, awnless, few- to many-flowered, sessile or peduncled; tepals petaloid, 6-parted in two series of 3 segments each, on a distinct pedicel or the base of the flower attenuated into a stipe-like base; stamens 9, the filaments filiform, often pilose at the base; ovary 1-celled, styles 3 with capitate stigmas; achenes mostly 3-angled or winged. A North American genus of some 240 species found mainly in the western United States. (Greek, *erion*, wool, and *gonu*, knee or joint, the type of the genus, *E. tomentosum* Michx. being hairy at the nodes.)

- A. Flowers with stipe-like bases, mostly yellow to reddish-yellow or rarely cream, glabrous or pubescent; low spreading caespitose to shrubby perennials. . . . . II. Subgenus *Oligogonum*
- AA. Flowers not attenuated into a stipe-like base.
- B. Plants perennials.
- C. Plants caespitose to large shrubs, not monocarpic; flowers white to yellow; stems glabrous to tomentose; achenes not winged, usually enclosed by the mature flower, brown to black. . . . . I. Subgenus *Eucycla*
- CC. Plants tall, strict and erect, monocarpic perennials; flowers yellow; stems strigose; achenes distinctly

- winged and obviously exerted beyond the mature flower, usually yellowish. . . . . III. Subgenus *Pterogonum*
- BB. Plants annual, or if perennial, then stems inflated and flowers yellow, hirsute and in pedunculated involucre.
- C. Involucres smooth, not ribbed or angled, usually distinctly peduncled, or if sessile, then not vertically appressed to the stems; annuals or perennials. . . . . IV. Subgenus *Ganysma*
- CC. Involucres angled to strongly ribbed, usually tightly appressed to the stems and always sessile; strictly annuals. . . . . V. Subgenus *Oregonium*

# I. EUCYCLA. *Plants caespitose to shrubby perennials*

- A. Plants distinct shrubs or subshrubs, woody above the caudex and not dying back completely to the ground after each year. . . . . SECTION A.
- AA. Plants herbaceous, caespitose or pulvinate perennials.
- B. Plants herbaceous; inflorescences open. . . . . SECTION B.
- BB. Plants caespitose or pulvinate; inflorescences usually, but not always, capitate. . . . . SECTION C.

## Section A. *Plants shrubs or subshrubs*

- A. Flowers pubescent without, 2.5-3 mm long, white to pink; low shrubs; Washington Co. . . . . 1. *E. fasciculatum*
- AA. Flowers glabrous without.
- B. Stems smooth, glabrous to tomentose; inflorescences with involucre arranged in loose to compact terminal cymes or racemously along the straight branches, the branches never zig-zag.
- C. Inflorescences large with numerous branches and branchlets bearing racemously arranged involucre at their tips; stems and branches glabrous to floccose or rarely densely tomentose.
- D. Leaves pubescent below with dense tomentum.
- E. Leaves linear-lanceolate to oblanceolate or elliptic, 1.5-4.5 cm long; involucre sessile or if peduncled, then stems glabrous.
- F. Leaves linear-lanceolate to oblanceolate or narrowly elliptic, 1.5-4.5 cm long, 2-8 mm wide; branches floccose to glabrous; eastern Utah. . . . . 2. *E. leptocladon*
- FF. Leaves oblanceolate to elliptic, 1-2.5 (3) cm long, (5) 10-20 mm wide; branches glabrous to tomentose; western Utah.
- G. Stems and branches tomentose; involucre sessile. . . . . 3. *E. kearneyi*
- GG. Stems and branches glabrous; involucre peduncled. . . . . 4. *E. ammophilum*
- EE. Leaves rounded or nearly so, 0.5-1 cm in diameter; stems and branches tomentose; western Utah. . . . . 5. *E. nummular*

- DD. Leaves glabrous on both surfaces.
- E. Inflorescences divided 3-6 times, bright green; flowers bright yellow, 3-4 mm long; Emery Co.  
 . . . . . 6. *E. smithii*
- EE. Inflorescences divided 10-20 times, yellowish-green; flowers pale-yellow to white, 2-3 mm long; Kane Co. . . . . 7. *E. mortonianum*
- CC. Inflorescences small and compact, cymose, with involucre dichotomously arranged even at the tips of the branches; stems usually tomentose, rarely floccose or glabrous.
- D. Leaves flat, not revolute.
- E. Leaf-blades 0.2-4 cm long.
- F. Leaf-apices sharply acute, the blades mostly narrowly elliptic or narrower, 1-8 mm wide. . . . . 13. *E. microthecum*
- FF. Leaf-apices acute to rounded, the blades oblanceolate to elliptic or orbicular, (0.5) 1-3 cm wide. . . . . 8. *E. corymbosum*
- EE. Leaf-blades 3-7 cm long.
- F. Leaf-apices rounded or nearly so, 1-3 (5) cm long. . . . . 8. *E. corymbosum*
- FF. Leaf-apices acute, usually sharply so, the blades more than 3 cm long.
- G. Stems and branches subglabrous to tomentose; involucre tomentose.
- H. Involucre 3-4 mm long.
- I. Flowers white; Bad Land Cliffs, Duchesne Co.  
 . . . . . 9. *E. hylophilum*
- II. Flowers yellow; Duchesne and Utah cos.  
 . . . . . 10. *E. Xduchesnense*
- HH. Involucre 2.5-3 mm long; flowers white; Carbon Co.  
 . . . . . 11. *E. lancifolium*
- GG. Stems and branches glabrous; involucre glabrous; Uintah Co. 12. *E. saurinum*
- DD. Leaves revolute.
- E. Leaf-blades 2-6 cm long.
- F. Inflorescences open to densely cymose, not broom-like, floccose to glabrate and grayish; common. . . . . 13. *E. microthecum*
- FF. Inflorescences densely cymose and broom-like, glabrous and green; San Juan Co.  
 . . . . . 14. *E. leptophyllum*
- EE. Leaf-blades 0.5-2 cm long.
- F. Low subshrubs 1-2 dm high; southern San Juan Co. . . . . 15. *E. clavellatum*
- FF. Low matted subshrubs less than 1 dm high; eastern Utah. . . . . 16. *E. bicolor*

- BB. Stems angled or ribbed, or if smooth then obviously scabrous, or if smooth and tomentose, then inflorescence of zig-zag branches; Washington Co.  
 C. Stems and branches angled and ribbed or smooth and scabrous; involucre 0.7-1.5 mm long. . . . . 17. *E. heermannii*  
 CC. Stems and branches tomentose; involucre 2-2.5 mm long. . . . . 18. *E. plumatella*

### Section B. *Plants herbaceous perennials*

- A. Involucres not arranged racemously along elongated branches.  
 B. Stems and branches pubescent.  
 C. Plants tall, more than 1 dm high.  
 D. Inflorescences umbellate to cymose, or if capitate then leaves revolute and more than 5 cm long.  
 E. Leaves linear and revolute or narrowly oblanceolate to narrowly elliptic; inflorescences capitate to umbellate, or if cymose, then plants 1-1.5 dm high and of north-central Utah; northern Utah. 19. *E. brevicaula*  
 EE. Leaves lanceolate to elliptic; inflorescences cymose; plants 1.5-4 dm high; south-central Utah. . . . . 20. *E. spathulatum*  
 DD. Inflorescences capitate; leaves oblanceolate to narrowly elliptic; Cache Valley. 21. *E. loganum*  
 CC. Plants less than 1 dm high.  
 D. Stems densely tomentose; inflorescences capitate to umbellate; leaves 3-7 cm long; northern and northeastern Utah. . . . . 19. *E. brevicaula*  
 DD. Stems glabrous or slightly floccose, green; inflorescences cymose; Grand and Garfield cos. . . . . 22. *E. contortum*  
 BB. Stems and branches glabrous.  
 C. Leaves linear to narrowly lanceolate or oblanceolate, not broadly elliptic, spatulate or rotund.  
 D. Leaves 3-10 cm long, linear to narrowly oblanceolate; stems 1-2.5 dm long, pale-green; involucre 2-4 mm long; flowers yellow; inflorescences cymose and open; northern and northeastern Utah. . . . . 19. *E. brevicaula*  
 DD. Leaves 1-5 cm long, linear and tightly revolute or lanceolate to oblanceolate and flat; eastern and southern Utah.  
 E. Leaves revolute, linear.  
 F. Plants 5-8 (10) cm high; stems floccose; branches floccose to glabrous; Grand and Garfield cos. . . . . 22. *E. contortum*  
 FF. Plants 1-3.5 dm high; stems and branches glabrous and bright green; leaves 1-4 cm long; involucre 2-3 mm long; inflorescences

- densely cymose; flowers yellow; Uinta Basin.  
 . . . . . 23. *E. viridulum*
- EE. Leaves flat, lanceolate to oblanceolate, 1-5  
 cm long; flowers white to pale-yellow.
- F. Inflorescences narrowly cymose, 1.5-2.5 dm  
 long, pale-green; leaves lanceolate, 1.5-2.5  
 cm long; flowers cream to pale-yellow, 2-2.5  
 mm long; eastern Uintah Co. . . . .
- . . . . . 24. *E. ephedroides*
- FF. Inflorescences open and spreading, usually  
 grayish or reddish; flowers white.
- G. Leaves 1.5-3 cm long, 2-5 (7) mm wide,  
 oblanceolate, on petioles 5-10 mm long;  
 involucre solitary; flowers 3-3.5 mm  
 long; San Juan Co. 25. *E. humivagans*
- GG. Leaves (2) 3-5 cm long, 2-4 mm wide,  
 lanceolate, on petioles 1-2 cm long;  
 involucre clustered; flowers 2-3 mm  
 long; Grand Co. 26. *E. intermontanum*
- CC. Leaves broadly elliptic to spatulate or rotund, or if  
 merely elliptic, then plants of southwestern Utah.
- D. Leaves elliptic to spatulate, densely white-tomen-  
 tose below, floccose to glabrous and green above,  
 or if tomentose on both surfaces, then plants of  
 eastern Utah.
- E. Stems and branches bright green; leaves (2) 3-5  
 cm long, 8-15 mm wide, tomentose below, green  
 and glabrous above; flowers yellow or white;  
 Kane and Washington cos. 27. *E. thompsonae*
- EE. Stems and branches grayish.
- F. Involucre not clustered; central and north-  
 central Utah.
- G. Leaves crenulate; involucre 3-4 mm  
 long; San Pete Co. northward to Davis  
 Co. along the Wasatch front. . . . .
- . . . . . 19. *E. brevicaulis*
- GG. Leaves not crenulate; involucre 2-2.5  
 mm long; Piute and Sevier cos. . . . .
- . . . . . 28. *E. ostlundii*
- FF. Involucre clustered, rarely solitary; east-  
 ern Utah.
- G. Leaves not crenulate, the leaf-blade  
 (1.5) 2-4 cm long; plants 2-4 dm high,  
 compact; Uintah and Duchesne cos. south-  
 ward to Garfield Co. 30. *E. batemanii*
- GG. Leaves crenulate, the leaf-blade 0.5-2  
 cm long; plants 0.7-2 dm high, spread-  
 ing; Henry Mountains, Garfield Co.  
 . . . . . 31. *E. cronquistii*
- DD. Leaves nearly rotund to ovate, densely tomentose on  
 both surfaces.

- E. Stems and branches glabrous; clay hills and flats, Millard Co. 29. *E. eremicum*  
 EE. Stems and branches tomentose; sandy hills, Tooele and Juab cos. 5. *E. nummular*  
 AA. Involucres racemosely arranged along elongated branches.  
 B. Stems tomentose to floccose; common. 32. *E. racemosum*  
 BB. Stems glabrous; Zion National Park. 33. *E. zionis*

Section C. *Plants caespitose to pulvinata*

- A. Involucres ebracteate, the bracts (1) 3-5 mm below the base of the involucre; leaves linear-ob lanceolate to narrowly elliptic, 5-15 mm long, 1-3 mm wide; flowers white, 2.5-4 mm long, the tepals dimorphic; eastern Utah. . . . 16. *E. bicolor*  
 AA. Involucres bracteate, the bracts immediately below the involucre, or if ebracteate, then flowers pilose.  
 B. Tepals homomorphic, glabrous or pubescent.  
 C. Flowers glabrous without.  
 D. Plants 1.5-3 dm high; leaves oblanceolate to narrowly elliptic, 2-5 (7) cm long, 3-7 mm wide; flowers white or yellow; low spreading mats, Cache Valley. . . . . 21. *E. loganum*  
 DD. Plants less than 1.5 dm high, or if taller, then leaves not as above.  
 E. Flowers yellow or pale-yellow, or if whitish, then plants of northern Utah.  
 F. Stems glabrous to floccose; leaves plane and usually crenulate.  
 G. Flowers bright yellow, 1.5-2.5 mm long; stems floccose to glabrous; Wasatch Mountains from Mt. Nebo northward to southern Box Elder Co. 34. *E. grayi*  
 GG. Flowers greenish-white to pale-yellow, 2-3 mm long; stems glabrous; Willard Peak, Box Elder Co. 35. *E. nanum*  
 FF. Stems densely tomentose, or if floccose or even glabrous, then leaves usually revolute and plane, or if flat, then margins not crenulate and such plants of the Wasatch Plateau.  
 G. Leaves plane and flat, elliptic to broadly elliptic, 1-2.5 cm long, (3) 5-8 mm wide, tomentose on both surfaces; stems densely tomentose; western Box Elder and Tooele cos. . . . . 36. *E. desertorum*  
 GG. Leaves revolute, infrequently flat, linear to narrowly oblanceolate, 2.5-5 cm long, 1.5-3 (5) mm wide, tomentose below, floccose to glabrous above; stems usually tomentose to glabrous

- on the Wasatch Plateau; desert ranges and mountains of central and northern Utah. . . . . 19. *E. brevicaulis*
- EE. Flowers white; stems glabrous; mountains of Sevier Co. southward to Kane and Washington cos. . . . . 37. *E. panguicense*
- CC. Flowers pilose without.
- D. Ovaries and achenes glabrous.
- E. Flowers white, becoming rustic to rose or red in age, 3-4.5 mm long; involucre 6-8 lobed with 5-12 flowers.
- F. Plants loosely caespitose with 10-20 rosettes; stems 2-8 cm long, prostrate; inflorescences cymose-umbellate; western and south-central Utah. 38. *E. villiflorum*
- FF. Plants densely pulvinate and forming hemispheric cushions of several hundred rosettes; stems 1-9 mm long, erect; inflorescences capitate; northeastern Utah. . . . . 39. *E. tumulosum*
- EE. Flowers yellow, 1.8-2.3 mm long; involucre 4-lobed with 2-4 flowers; stems lacking; rare endemic, Garfield Co. 40. *E. aretioides*
- DD. Ovaries and achenes pubescent; flowers white or yellow, 2.5-4 mm long; common on the deserts of western and southeastern Utah. 41. *E. shockleyi*
- BB. Tepals dimorphic, the outer whorl distinctly wider than the inner whorl, or if only slightly dimorphic, then plants with oval to rotund leaf-blades 2-8 mm long and wide and restricted to the high mountains of northwestern Utah; a highly variable species found throughout the state in numerous habitats. . . . . 42. *E. ovalifolium*

## II. OLIGOGONUM. *Perennial plants with stipitate flowers*

- A. Flowers glabrous without.
- B. Stems without a whorl of bracts about the middle; common throughout the state. . . . . 43. *E. umbellatum*
- BB. Stems with a whorl of bracts about the middle; common in northern Utah. . . . . 44. *E. heracleoides*
- AA. Flowers pubescent without.
- B. Stems ebracteate and scapose; inflorescences capitate; low desert ranges of western Utah. . . 45. *E. caespitosum*
- BB. Stems bracteate and not scapose; inflorescences mostly divided; southwestern and eastern Utah. 46. *E. jamesii*

## III. PTEROGONUM. *Tall monocarpic plants with winged fruits*

- Only a single species; southern and eastern Utah. 47. *E. alatum*

## IV. GANYSMA. *Mostly annual plants with smooth involucre*

- A. Leaves glabrous, pilose, hispid or villous on one or both surfaces.
- B. Flowers pubescent without with pilose to hirsute hairs, yellow.
- C. Involucres with distinct tubes.
  - D. Plants glabrous, or if glandular, the glands small and infrequent, restricted to the base of the stem.
  - E. Involucres 5-lobed; plants annual or perennial with open inflorescences, the lower nodes with 3-5 branchlets, the upper nodes dichotomous or trichotomous; flowers 1-3 mm long; stems usually inflated; southern and eastern Utah.
    - 48. *E. inflatum*
  - EE. Involucres 4-lobed; plants strictly annual with whorls of branches (often 5-20) radiating from the lower nodes, the upper branches with several branchlets at each node; flowers mostly 1-2 mm long; stems usually not inflated; Washington Co.
    - 49. *E. trichopes*
  - DD. Plants glandular; involucres mostly 5-lobed; peduncles slender, straight or curved upwards, glandular only on the lower half; flowers 1-1.5 (2) mm long; rare, western Utah.
    - 50. *E. howellianum*
- CC. Involucres composed of two distinct whorls of 3 lobes.
  - D. Leaves strictly basal; peduncles 1-3 cm long, flexed; plants erect, sparsely glandular; infrequent, eastern Utah.
    - 51. *E. flexum*
  - DD. Leaves basal and cauline; peduncles up to 4 cm long, often lacking, straight; plants spreading, glabrous; eastern Utah.
    - 52. *E. salsuginosum*
- BB. Flowers glabrous, white, 1-2.5 mm long; stems glabrous or sparsely villous; eastern Utah.
  - 53. *E. gordonii*
- AA. Leaves tomentose to lanate, at least below.
  - B. Leaves strictly basal or sheathing up the stems.
    - C. Involucres 1-3 mm long, or if shorter, then flowers with saccate-dilated bases on the outer tepals.
    - D. Flowers glabrous without.
      - E. Outer tepals cordate at the base, mostly oblong to orbicular, or if obtuse at the base, then plants scabrellous or margins of the tepals entire and not crispate.
      - F. Involucres deflexed.
        - G. Plants glabrous.
          - H. Involucres turbinate; flowers white to pink; western and southern Utah.
            - 54. *E. deflexum*
          - HH. Involucres broadly campanulate; flowers yellow to reddish-yellow; common.
            - 55. *E. hookeri*
        - GG. Plants glandular throughout; common, Washington Co.
          - 56. *E. brachypodum*

- FF. Involucres erect or arising from the side of the stem and remaining horizontal.  
 G. Stems and branches glabrous; involucres erect; Washington Co. 57. *E. insigne*  
 GG. Stems and branches scabrellous; involucres horizontal, beyond turned downward at maturity; eastern Utah along the Colorado drainage system. . . . . 58. *E. scabrellum*  
 EE. Outer tepals truncate to obtuse at the base.  
 F. Outer tepals pandurate, crisped along the margins; peduncles cernuous or ascending, glabrous; common throughout the state. . . . . 59. *E. cernuum*  
 FF. Outer tepals oblong to oval, entire margined; peduncles curving downward, glandular; northern Utah. 60. *E. nutans*  
 DD. Flowers glandular or sparsely pubescent.  
 E. Involucres glabrous without; flowers short-hispidulous, the outer tepals saccate on both sides of the base; Washington Co. . . . . 61. *E. thomasi*  
 EE. Involucres glandular without; flowers glandular, the outer tepals not saccate; Washington Co. . . . . 62. *E. pusillum*  
 CC. Involucres 0.3-1 mm long.  
 D. Flowers yellow to red, 0.5-1.5 mm long; involucres 4-lobed; inflorescences densely branched and spreading; sandy soil, eastern Utah. . . . . 63. *E. wetherillii*  
 DD. Flowers white to pink or rose, 0.8-2 mm long; involucres 5-lobed; inflorescences open and erect; clay hills, southern Utah. 64. *E. subreniforme*  
 BB. Leaves basal and cauline.  
 C. Flowers glabrous, yellow; leaves linear or nearly so; involucres with + erect lobes; rare, desert ranges of western Utah. . . . . 65. *E. pharnaceoides*  
 CC. Flowers glandular, white to pale-yellow or pink to red; leaves lanceolate to obovate; involucres with short, erect teeth; deserts of western Utah. . . . . 66. *E. maculatum*
- V. OREGONIUM. *Annuals with ribbed or angled involucres*  
 A. Leaves tomentose, at least below.  
 B. Stems glabrous; leaves basal; flowers glabrous; Washington and Kane cos. . . . . 67. *E. davidsonii*  
 BB. Stems tomentose to floccose.  
 C. Leaves basal; plants low and spreading.  
 D. Flowers yellow to red, the outer tepals broadly fan-shaped; western Utah. 68. *E. nidularium*

- DD. Flowers white, the outer tepals narrowly fan-shaped; western and southern Utah. 69. *E. palmerianum*
- CC. Leaves cauline; plants strict, tall and erect; rare in Washington and Kane cos. 70. *E. polycladon*
- AA. Leaves puberulent to villous.
- B. Stem-leaves foliaceous at the lower nodes, puberulent or short pilose; involucre 5-lobed; flowers yellowish, hispidulous and often glandular, 1.5-2 mm long; eastern and central Utah on clay slopes. 71. *E. divaricatum*
- BB. Stem-leaves bract-like, silky-pubescent; involucre 4-lobed; flowers white to red, glabrous or hispidulous, 1-1.5 mm long; southwestern Utah. . . . 72. *E. puberulum*

### SUBGENUS EUCYCLA (NUTT.) KUNTZE

1. *E. FASCICULATUM* Benth. var. *POLIFOLIUM* (Benth. in DC.) Torr. & Gray. [E.p. Benth. in DC. *E. revolutum* Goodd. E.f. ssp. p. S. Stokes. E.f. var. *r.* S.Stokes.] Low rounded and + compact or spreading subshrubs or shrubs 2-5 (8) dm high and up to 1 m across; leaves fascicled, mostly oblanceolate, 6-18 mm long, (1) 2-6 mm wide, often revolute, canescent on both surfaces or tomentose below and canescent above; stems 3-15 cm long, thinly tomentose to canescent; inflorescences congested or nearly so, occasionally umbellate; involucre turbinate to turbinate-campanulate, 2.5-3.5 mm long, 2-3.5 mm wide, canescent without; flowers white to pink, 2.5-3 mm long, pubescent without on the base and midrib; achenes light brown, 2-2.5 mm long.---Rocky places mostly in the low desert ranges of Washington Co.; s. to w. Ariz. and w. across s. Nev. and e. Calif. to Baja Calif. Apr-Jul.

2. *E. LEPTOCLADON* Torr. & Gray. Large erect to spreading diffusely branched shrubs (2) 3-10 (13) dm high, 0.5-1.5 (2) m across; leaves linear-lanceolate to linear-oblanceolate or narrowly oblong, 1.5-4.5 cm long, 2-8 mm wide, densely white-tomentose below, less so and often greenish above, the margin slightly revolute in some, the petiole 2-5 mm long; stems 3-10 cm long, tomentose to floccose or glabrous; inflorescences large, open, cymose, 1-4 dm long, 1-5 dm across, lightly tomentose to floccose or glabrous, the involucre racemously arranged at the tips of the branches and branchlets; involucre turbinate to turbinate-campanulate, 1.5-3 mm long, 1-2 mm wide, tomentose to glabrous without, the 5 acute to rounded teeth 0.4-0.7 mm long; flowers white or pale-yellow to yellow with reddish-brown to brown midribs and bases, (2) 2.5-3.5 mm long, glabrous, the tepals obovate to nearly fan-shaped, the inner whorl usually slightly narrower; achenes light brown, 2.5-3.5 mm long.---Sandy places of e. Utah from Emery and Grand cos. s. to N.M. and Ariz.

VAR. *LEPTOCLADON*. [*E. microthecum* var. *l.* Torr. & Gray. *E. effusum* ssp. *l.* S.Stokes. E.e. var. *shandsii* S.Stokes.] Stems floccose and often greenish; flowers pale-yellow to yellow.---Sandy

places in Emery and Grand cos. s. to e. Garfield and central San Juan Co. Endemic. Jul-Sep.

VAR. RAMOSISSIMUM (Eastw.) Reveal. [*E.r.* Eastw. *E. eastwoodae* M.E. Jones.] Stems tomentose to floccose; flowers white.---Common in sandy places from s. Emery Co. s into Kane and San Juan cos.; sw. Colo., nw. N.M. and ne. Ariz. Jun-Oct.

VAR. PAPILIUNCULUM Reveal. Stems glabrous; flowers white.---Infrequent in central Garfield and e. Kane cos.; s. to n. Ariz. Aug-Oct.

3. *E. KEARNEYI* Tidestr. [*E. nodosum* var. *k.* S.Stokes. *E. dudleyanum* S.Stokes.] Low to tall spreading subshrubs to shrubs 2-8 dm high, 0.3-1 (1.3) m across; leaves broadly oblanceolate to elliptic, 1-2.5 (3) cm long, 4-12 (15) mm wide, densely white-tomentose below, slightly less so and greenish above, the margin not revolute, the petiole 2-10 mm long; stems 5-10 cm long, tomentose; inflorescences large, open, cymose, 0.5-5 dm long, 0.5-8 dm across, tomentose, the involucre racemosely arranged at the tips of the branches; peduncles, when present, up to 5 mm long, tomentose; involucre turbinate, 2-2.5 mm long, 1.5-2 mm wide, tomentose without, the 5 acute teeth 0.1-0.4 mm long; flowers white with reddish to reddish-brown midribs and bases, 1.5-3 mm long, glabrous, the tepals obovate, the inner whorl slightly narrower; achenes light brown, 2-3 mm long.---Sandy places in w. and sw. Utah, ranging from e. Tooele Co. s. to n. Millard Co., then re-entering the state in Washington and Kane cos.; e. Calif., Nev. e. to nw. Ariz. Jul-Sep.

A rather variable species in Utah, *Eriogonum kearneyi* may be recognized by its broad leaves. It is, however, closely related to *E. leptocladon*, and especially var. *ramosissimum*. The two can be separated only with some difficulty in Kane Co. To the west of us, *E. kearneyi* is found in widely scattered locations, becoming differentiated into a var. *monoense* (S.Stokes) Reveal in eastern California.

4. *E. AMMOPHILUM* Reveal. Low subshrubs 2-4 dm high, 2-5 dm across; leaves elliptic to broadly elliptic, 1-2.5 (2.8) cm long, 8-17 mm wide, densely white-tomentose below, less so to subglabrous and green above, the petiole 1-5 (15) mm long; stems 5-15 cm long, glabrous; inflorescences large, open, cymose, 5-20 cm long, up to 25 cm across, glabrous, the involucre racemosely arranged only at the very tips of the branches; peduncles (2) 5-10 (12) mm long, glabrous; involucre turbinate, (2.5) 3-3.5 mm long, 2-2.5 mm wide, glabrous, the 5 acute teeth 0.4-0.8 mm long; flowers white with reddish-brown midribs and bases, 2-3 mm long, glabrous, the tepals narrowly obovate, the inner whorl slightly narrower; achenes light brown, 2.5-3 (3.5) mm long.---Infrequent in dry sandy places in w-central Millard Co. Endemic. Jun-Sep.

This new species, described in 1972, is rare in the few known locations it has been found to date.

5. *E. NUMMULARE* M.E. Jones. Low subshrubs 1-2 (2.5) dm high, 2-5 dm across; leaves orbicular or rotund, 0.5-1 cm in diameter, densely white-tomentose on both surfaces, the petiole 3-5 mm long; stems 3-7 cm long, densely tomentose; inflorescences large, open, cymose, 1-1.5 dm long, 0.5-1 dm across, densely tomentose, the involucre racemosely arranged only at the very tips of the branches; peduncles 2-8 (10) mm long, tomentose; involucre turbinate, 1.5-2 mm long, 1.2-1.8 mm wide, tomentose, the 5 acute teeth 0.3-0.7 mm long; flowers white with reddish-brown midribs and bases, 1.6-2 mm long, glabrous, the tepals oblong; achenes light brown, 2 mm long.---Dry sandy places in w. Tooele and Juab cos. Endemic. Jun-Aug.

6. *E. SMITHII* Reveal. Large erect to spreading totally glabrous shrubs (3) 4-8 dm high, 0.5-2 m across; leaves narrowly elliptic, 2.5-4.5 cm long, 6-10 mm wide, the margin thickened and usually revolute, the petiole 3-5 mm long; stems 2-20 cm long; inflorescences open to  $\pm$  compact, cymose, 2-25 cm long, 3-35 cm wide, divided 3-6 times, bright green; involucre turbinate, (2.5) 3-3.5 mm long, 2-2.5 mm wide, the 5 acute teeth 0.3-0.5 mm long; flowers bright yellow, 3-4 mm long, glabrous, the tepals obovate, the inner whorl slightly narrower; achenes brown, 3 mm long.---Locally common in deep red "blow" sand in s. San Rafael Desert, Emery Co. Endemic. Jul-Sep.

7. *E. MORTONIANUM* Reveal. Large erect totally glabrous shrubs 4-8 (10) dm high, 0.5-1 (1.3) m across; leaves elliptic, 1.5-4 (4.5) cm long, (3) 6-10 (12) mm wide, the margin thickened and not revolute, the petiole (2) 3-8 (10) mm long; stems 5-10 (12) cm long; inflorescences large, open, cymose, 15-25 cm long, 15-30 cm wide, divided 10-20 times, pale-yellowish-green; involucre turbinate, 2-2.5 mm long, 1.2-1.8 (2) mm wide, the 5 acute teeth 0.3-0.4 mm long; flowers pale-yellow to white, (2) 2.5-3 mm long, glabrous, the tepals obovate, the inner whorl slightly narrower; achenes light brown, 3-3.5 mm long.---Known presently only from red clay hills 4.5 mi sw. of Fredonia, Mohave Co., Arizona, but to be expected in s. Kane Co. Jul-Sep.

The two glabrous shrubs, *E. smithii* and *E. mortonianum*, are the only species which have a nearly total lack of pubescence. However, on close inspection, some can be found. The early leaves, for example, may be faintly pubescent along the midrib on the upper surface, and some pubescence can be observed in the axil of the leaves and on the inner surface of the involucral tube. Still when casually observed, these two species appear to be glabrous.

8. *E. CORYMBOSUM* Benth. in DC. Low spreading subshrubs to tall and erect to rounded shrubs (2) 3-8 (12) dm high, 0.4-1.5 (2) m across; leaves lanceolate to oblanceolate or elliptic to nearly orbicular, 1-3 (4.5) cm long, (0.3) 0.5-3 (3.5) cm wide, densely white-tomentose on both surfaces or less so to subglabrous or glabrous

and green above, the margin entire or crenulate, not revolute, the petiole 2-15 mm long; stems (0.5) 1-2 dm long, tomentose to subglabrous or rarely glabrous; inflorescences cymose, (1) 2.5-20 cm long, 2-30 cm wide, tomentose to glabrous; involucre turbinate, 1.5-3.5 mm long, 1-2 (2.5) mm wide, tomentose to glabrous without, the 5 acute teeth 0.3-1 mm long; flowers white with greenish or reddish midribs and bases, whitish-brown with reddish bases, or yellow, 2.5-3.5 (4) mm long, glabrous, the tepals oblanceolate to spatulate, the inner whorl slightly narrower; achenes brown, 2-2.5 (3) mm long.---Rather common on clay hills and flats in e. and s. Utah; e. to sw. Wyo., w. Colo., n. N.M., and into n. Ariz. and s. Nev.

Since this species was reviewed (Reveal, 1968b) one new species has been described by Welsh (1970) and reduced to synonymy by me (Reveal, 1971), while recent field studies in Wyoming have shown that *E. salinum* A.Nels. is not a synonym of var. *corymbosum* but of var. *erectum*.

#### KEY TO THE VARIETIES

- A. Flowers white to brownish-white, not yellow.
  - B. Leaves oblanceolate to elliptic, 1-3 (4.5) cm long, 1-2 cm wide, the petiole 2-6 mm long.
    - C. Involucre 1.5-2.5 mm long, 1-1.5 mm wide; stems spreading into subglobose crowns, the branches white-tomentose; flowers white; mostly below 6000 feet in e. and s. Utah. . . . . var. *corymbosum*
    - CC. Involucre 2.5-3.5 mm long, 1.5-2 mm wide.
      - D. Stems and crowns open and erect, the branches brownish-tomentose; leaves 2-3.5 cm long, 0.5-1.5 cm wide, brownish-tomentose; mostly above 6000 feet, ne. Utah . . . . . var. *erectum*
      - DD. Stems and crowns spreading, the branches silvery-tomentose; leaves 3-4 cm long, (0.5) 1-2 cm wide, silvery-tomentose; Carbon Co. . . . . var. *davidsei*
  - BB. Leaves elliptical-oblong to nearly orbicular, 1-3 (4) cm long, 1-3 (3.5) cm wide, the petiole 5-10 (15) mm long.
    - C. Plants greenish; leaves mostly thinly tomentose below, subglabrous to glabrous and green above; flowers 2.5-3 mm long; sandy places, e. Utah. . . . . var. *orbiculatum*
    - CC. Plants brownish-white; leaves densely tomentose below, floccose above; flowers 2-2.5 mm long; clay hills and bluffs, San Juan Co. . . . . var. *velutinum*
  - AA. Flowers yellow; stems and branches glabrous to floccose; s. and sw. Utah in sandy to clay soil. . . . . var. *glutinosum*

**VAR. CORYMBOSUM.** [E.c. var. *divaricatum* Torr. & Gray. *E. divergens* Small. *E. effusum* ssp. c. S.Stokes. *E.e.* ssp. *divaricatum* S. Stokes. *E.e.* ssp. *durum* S.Stokes. *E. revealianum* Welsh.] Subshrubs to shrubs 3-8 dm high, the crown suberect to subglobose, up to 1 m across; leaves lanceolate to oblanceolate or elliptic, 1-3 (4.5) cm long, (0.3) 0.5-1 (1.5) cm wide; inflorescences 3-10 cm long, usually densely tomentose; involucre 1.5-2.5 mm long, 1-1.5 mm

wide; flowers white, 2-3 (3.5) mm long.---Dry clay hillsides and flats from ne. Utah sw. to Kane Co., and s. to Grand Co.; e. to w. Colo. and in n. Ariz. Jul-Oct.

VAR. ERECTUM Reveal & Brotherson. [*E. salinum* A.Nels. *E. effusum* ssp. *δ*. S.Stokes.] Erect shrubs (3) 6-10 dm high and up to 8 dm across; leaves lanceolate to elliptic, 2-3.5 cm long, 0.5-1.5 cm wide, brownish-tomentose below, less so to subglabrous and greenish above; inflorescences 2.5-7 cm long, usually densely tomentose; involucre 2.5-3.5 mm long, 1.5-2 mm wide; flowers brownish-white, 2.5-3 mm long.---Mostly in pinyon-juniper woodlands above 6000 feet in Duchesne, Utah and Uintah cos.; disjunctly in Sweetwater Co., Wyo. Jul-Sep.

This variety will frequently form hybrid populations with *E. brevicaule*. These intermediate forms are here recognized as *E. Xduchesense* (see # 10 below).

VAR. DAVIDSEI Reveal. Large spreading shrubs 8-12 dm high and 5-15 (20) dm across; leaves lanceolate to elliptic, 3-4 cm long, (0.5) 1-2 cm wide, densely silvery-tomentose below, slightly less so above; inflorescences 3-6 cm long, tomentose; involucre 2.5-3 mm long, 1.5-2 mm wide; flowers brownish-white, 2-2.5 mm long.---Endemic to clay hills just south of Wellington, Carbon Co. Endemic. Jul-Oct.

VAR. ORBICULATUM (S.Stokes) Reveal & Brotherson. [*E. effusum* ssp. *ο*. S.Stokes.] Large compact and hemispheric shrubs (3) 5-12 dm high, 0.5-2 m across; leaves mostly orbicular, 1-3 cm long and wide, floccose to thinly tomentose on both surfaces, usually deep green; inflorescences dense, up to 2 dm long and 3 dm across, of rigid branches; flowers white, 2.5-3 mm long.---Common in sandy soil along the Colorado River drainage from Emery and Grand cos. s. into San Juan Co.; e. into w -central Colo. and perhaps in nw. N.M. Jul-Oct.

VAR. VELUTINUM Reveal: Large shrubs 5-10 dm high, 0.5-2 m across; leaves mostly oblong, 2-2.5 (3.5) cm long, 1.5-2.5 (3) cm wide, densely tomentose below, floccose above; inflorescences dense to  $\pm$  open, 4-10 cm long, of stout but not rigid branches; flowers brownish-white, 2-2.5 mm long.---Clay hills and bluffs of San Juan Co.; n -central N.M. and e. Ariz. Jul-Oct.

When originally proposed in 1968, this variety was thought to be restricted to central New Mexico. Since then additional collections have shown var. *velutinum* to occur in eastern Arizona, and reevaluation of some older material from Utah has made it necessary to include the variety in this state as well.

VAR. GLUTINOSUM (M.E. Jones) M.E. Jones. [*E. aureum* M.E. Jones. *E.a.* var. *g*. M.E. Jones. *E. fruticosum* A.Nels. *E.f.* var. *g*. A.Nels. *E. crispum* L.O. Will. *E. microthecum* ssp. *a*. S.Stokes. *E.m.* var. *c*. S.Stokes.] Low subshrubs to large rounded shrubs 2-10 dm high, (3) 5-20 dm across; leaves lanceolate to oblanceolate or elliptic, 1-4 cm long, 0.5-1.5 cm wide; inflorescences 3-10 cm long, glabrous to

tomentose; involucre 1-2 mm long, 1-1.5 (2) mm wide; flowers yellow, 1.5-2.5 mm long.---Rather common in s. Utah from Garfield Co. sw. to Kane and Washington cos.; s. to n. Ariz. and w. to s. Nev. Jul-Oct.

9. *E. HYLOPHILUM* Reveal & Brotherson. Low subshrubs 2.5-4 dm high, 2-5 dm across; leaves linear-lanceolate to lanceolate, 3.5-7 cm long, 3-6 (8) mm wide, densely white-tomentose below, less so to floccose and green above, the margin infrequently crenulate or revolute, the petiole 5-10 (18) mm long; stems 0.5-1.5 dm long, tomentose; inflorescences cymose-umbellate to cymose, open, 3-8 cm long and wide, tomentose; involucre turbinate, 3.5-4 mm long, 2.5-3 mm wide, tomentose, the 5 (6) acute teeth 0.5-0.8 mm long; flowers white, (3) 3.5-4 (4.5) mm long, glabrous, the tepals spatulate to oblanceolate, the inner whorl narrower; achenes brown, 2.5-3 mm long.---Endemic to the Bad Land Cliffs, Duchesne Co. Jul-Sep.

10. *E. XDUCHESENSE* Reveal. (*pro. sp.*). [*E. corymbosum* var. *albogilvum* Reveal.] Low spreading subshrubs to rounded shrubs 2-4 (5) dm high, 3-5 (8) dm across; leaves lanceolate to spatulate or elliptic, (1) 2-4 cm long, (4) 5-10 mm wide, densely white-tomentose below, floccose and greenish above, the margin often crenulate, the petiole 4-7 mm long; stems (0.3) 0.5-1 dm long, tomentose; inflorescences cymose, open to  $\pm$  compact, (1) 3-10 cm long, (3) 5-15 cm wide, tomentose; involucre turbinate, (2.5) 3-3.5 mm long, (1.5) 2-2.5 mm wide, tomentose, the 5 deltoid to acute teeth (0.3) 0.5-1 (1.2) mm long; flowers pale-yellow to yellow, 2.5-3 mm long, glabrous, the tepals narrowly obcordate; achenes brown, 2-3 mm long.---Widely scattered locations in Utah and Duchesne cos.; ne. to s. Sweetwater Co., Wyo. Jul-Sep.

The status of the name *Eriogonum duchesnense* is changed to a hybrid species (Stafleu, et al., 1972) at this time following extensive field work in northeastern Utah and southwestern Wyoming where small populations were found which represented clear hybrid swarms between *E. corymbosum* var. *erectum* and *E. brevicaulis* var. *brevicaule*. As these plants are distinct and often collected, a formal name is applied to them.

11. *E. LANCIFOLIUM* Reveal & Brotherson. Low sparsely branched shrubs 3.5-5 dm high, 3-6 dm across; leaves lanceolate, 3-5 cm long and 0.5-1 cm wide, densely white-tomentose below, less so to subglabrous and greenish above, the margin often crenulate, revolute in some, the petiole 3-6 mm long; stems 3-8 cm long, floccose to subglabrous; inflorescences cymose, dense, 6-14 cm long, 4-10 cm wide, floccose to subglabrous; involucre turbinate, 2.5-3 mm long, 1.5-2 mm wide, tomentose to floccose, the 5 acute teeth 0.3-0.7 mm long; flowers white, 3-3.5 mm long, glabrous, the outer whorl of tepals spatulate, the inner whorl distinctly narrower and oblanceolate; achenes brown, 2 mm long.---Endemic to clay hills in the Price and Wellington area, Carbon Co. Jul-Sep.

12. *E. SAURINUM* Reveal. Large erect shrubs 3-5 dm high, 3-6 dm across; leaves lanceolate, 3-6 cm long, 4-8 mm wide, densely white-tomentose below, floccose and green above, the petiole 5-10 mm long; stems 1.5-3 dm long, glabrous; inflorescences cymose,  $\pm$  dense to open, 1-2 dm long, 0.5-1.5 dm wide, glabrous; involucre turbinate, 2-3 mm long, 1.5-2 mm wide, glabrous, the 5 acute to rounded teeth 0.4-0.6 mm long; flowers cream to pale yellowish-white, 2-3 mm long, glabrous, the tepals oblanceolate; achenes light brown, 2.5-3 mm long.---Restricted to Mowry Shale n. and ne. of Vernal, Uintah Co.; nw. Colo. Jul-Sep.

13. *E. MICROTHECUM* Nutt. Low to tall, spreading to erect, open to compact subshrubs to shrubs 0.4-10 dm high, 0.6-1.3 m across; leaves mostly elliptic 0.5-2 (2.5) cm long, 0.5-6 mm wide, tomentose below, slightly less so to nearly glabrous above, the margin flat or revolute, the petiole 0.5-5 mm long; stems 1-8 cm long, tomentose to floccose or glabrous; inflorescences cymose, rather congested and compact, 1-6 (8) cm long, 1-8 cm wide, tomentose to glabrous; peduncles, when present, up to 1 cm long, tomentose to glabrous; involucre turbinate, 2-3 (3.5) mm long, 1.3-2.5 (3) mm wide, tomentose to floccose or rarely subglabrous, the 5 rounded to triangular teeth (0.3) 0.5-1 mm long; flowers white with green to reddish-brown bases and midribs, 2-3 mm long, glabrous, the tepals obovate, the inner whorl slightly narrower; achenes light brown to brown, 2-3 mm long.---Widespread desert and montane shrub of e. Wash. s. to s. Calif., e. across Ida., w. Mont. and w. Wyo. to central Colo., nw. N.M. and n. Ariz. Jun-Oct.

The *Eriogonum microthecum* complex is composed of nine varieties found throughout much of the western United States (Reveal, 1971). In Utah, it has two of the more common variants, var. *laxiflorum* and var. *foliosum*. A third variant is to be expected in Utah, the var. *lapidicola*, which comes close to the state in western Lincoln Co., Nevada. A Purpus collection (6249) from an unknown location in western Utah may be this variant, but until additional material of this plant is found, it is impossible to assign the Purpus collection with any confidence to either var. *foliosum* or var. *lapidicola*.

VAR. *LAXIFLORUM* Hook. [*E. tenellum* var. *grandiflorum* Gand. E.m. ssp. l. S.Stokes.] Low to erect, spreading to sparsely branched subshrubs or low shrubs (1) 2-4 (5) dm high, 2-8 dm across; leaves mostly elliptic, (0.5) 1-2 (2.5) cm long, (1.5) 2.5-6 mm wide, densely to sparsely white-tomentose below, less so to floccose above, the margin plane or with thickened margins, not revolute; stems 2-6 (8) cm long, floccose to sparsely tomentose when young, becoming glabrous or subglabrous and greenish; inflorescences (1) 2-4 (8) cm long, floccose to glabrous; involucre 2-3 (3.5) mm long, mostly subglabrous or glabrous; flowers white, 2-3 mm long.---Found throughout Utah in all sections except the se. quarter of the state; e. Wash. and w. Mont. s. to e. Calif., s. Nev. and n. Ariz. Jun-Sep. This is the common phase of the species.

VAR. FOLIOSUM (Torr. & Gray) Reveal. [*E. effusum* var. *f.* Torr. & Gray. *E. simpsonii* Benth. in DC. *E.m.* var. *rigidum* Eastw. *E. friscanum* M.E. Jones. *E. nelsonii* L.Will. *E.m.* ssp. *r.* S.Stokes. *E.m.* var. *friscanum* S.Stokes. *E.e.* ssp. *s.* S.Stokes. *E.e.* ssp. *n.* S. Stokes.] Low to erect, spreading to sparsely branched subshrubs or shrubs 1-10 dm high, 1-12 dm across; leaves mostly narrowly elliptic, 0.5-1.8 (2) cm long, (0.5) 1-2 (2.5) mm wide, densely white tomentose below, floccose and whitish-green above, the margin revolute; stems 2-7 cm long, densely lanate to tomentose; inflorescences (1.5) 2-4 (6) cm long, tomentose to floccose; involucre 2-3 mm long, mostly tomentose to floccose; flowers white, 2-3 mm long. ---Common on clay hills and desert slopes in the e. third of Utah and in the sw. part of the state on mostly limestone hills and valley floors; s. Nev. e. to w. and s-central Colo., s. to n. Ariz. and nw. N.M. Jun-Oct.

The var. *lapidicola* Reveal is to be expected in southwestern Utah. It differs from var. *foliosum* in having brownish or reddish tomentum, elliptical leaves 3-7 mm long and 1-4 mm wide, longer involucres ranging from (2.5) 3-3.5 mm long, and whitish flowers which frequently becoming red to rose with age. This low subshrub rarely exceeds 1.5 dm in height.

14. *E. LEPTOPHYLLUM* (Torr. in Sitgr.) Woot. & Stand. Large, rounded, heavily-branched shrubs 2-6 dm high, 0.3-1 m across; leaves linear to linear-oblancheolate, (1.5) 2-6 cm long, (0.8) 1-2.5 (3) mm wide, densely to thinly white-tomentose below, glabrous and green above, the margin tightly revolute, the petiole 0.4-1 mm long; stems 1-8 cm long, glabrous; inflorescences cymose, dense and broom-like with numerous glabrous branches, 2-15 cm long, 4-15 cm wide; involucres narrowly turbinate, 2-3 mm long, 1.1-1.7 (2) mm wide, glabrous, the 5 acute teeth 0.3-0.7 mm long; flowers white with greenish-brown midribs and bases, 2.5-4 mm long, glabrous, the tepals oblong to narrowly obovate; achenes brown, 3.5-4 mm long. --- Not known from Utah but to be expected in se. San Juan Co.; sw. Colo. s. to ne. Ariz. and nw. N.M. Jul-Oct.

15. *E. CLAVELLATUM* Small. Low rounded subshrubs 1-2 dm high, 3-8 dm across; leaves oblanceolate, 5-12 (15) mm long, 0.8-1.7 (2) mm wide, densely white-tomentose below, thinly pubescent and green above but becoming glabrous, the margin tightly revolute, the petiole 0.5-1.5 mm long; stems 0.6-2 cm long, usually glabrous; inflorescences umbellate-cymose, 0.5-1.5 cm long, 1-2 cm wide, glabrous; peduncles slender, 1.5-4 mm long, glabrous; involucres turbinate-campanulate, (3.5) 4-4.5 mm long, 2.5-4.5 mm wide, glabrous, the 5 acute teeth 0.6-0.9 mm long; flowers white with greenish-brown to reddish-brown midribs and bases, 3-3.5 mm long, glabrous, the tepals dimorphic, the outer whorl broadly obovate to nearly fan-shaped, 2-2.5 mm wide, those of the inner whorl oblanceolate to spatulate, 0.9-1.5 mm wide and slightly shorter; achenes light brown, 3-3.5 mm long. ---Clay hills and slopes, s-central San Juan Co. near Bluff. Endemic. Apr-Jun.

16. *E. BICOLOR* M.E. Jones. [*E. microthecum* ssp. *b.* S.Stokes.] Low rounded subshrubs 2-6 cm high, 5-20 (30) cm across; leaves linear-ob lanceolate to narrowly elliptic, 5-12 (15) mm long, 1-2 (3) mm wide, densely white-tomentose below, slightly less so above, the margin revolute, the petiole 1-1.5 mm long; stems 3-22 mm long, densely tomentose; inflorescences umbellate-cymose, 5-10 mm long, 5-15 mm wide, rarely reduced to a single ray, tomentose; peduncles 1.5-3 (4) mm long, tomentose to subglabrous; involucre turbinate-campanulate, 2-4 mm long, 1.5-3 mm wide, tomentose to subglabrous or glabrous, the 5 acute teeth 0.4-0.7 mm long; flowers white with greenish-brown to reddish-brown midribs and bases, 2.5-4 mm long, glabrous, the tepals dimorphic, the outer whorl broadly obovate to nearly orbicular, (2) 2.5-3 mm wide, the inner whorl oblanceolate to narrowly elliptic, 1-1.5 mm wide, slightly shorter; achenes light brown, 3-3.5 mm long.---Infrequent on clay to gumbo clay hills and flats in e. Utah, from Carbon Co. s. to e. Garfield and n. San Juan Co.; e. to w. Colo. Apr-Jun.

17. *E. HEERMANNII* Dur. & Hilg. Low spreading divaricately branched subshrubs 1-4 dm high and 1.5-6 dm across, or low spreading shrubs 3-6 dm high and 3-8 dm across; leaves linear-lanceolate to elliptic or spatulate, 4-12 mm long, 2-5 mm wide, sparsely to densely tomentose below, subglabrous to glabrous above, the margin flat or slightly revolute, the petiole 3-10 mm long; stems 0.3-4 cm long, glabrous, scabrous or smooth, angled or ribbed in some; inflorescences cymose panicles, mostly clustered, with slender rigid angled or ribbed branches arranged in inflorescences 1-5 cm long and 3-10 cm wide, or with stout rigid smooth branches arranged in inflorescences 1-1.5 dm long, 1-2 dm wide; involucre campanulate, 0.7-1.5 mm long and wide, glabrous, the 5 rounded teeth 0.3-0.5 mm long; flowers yellowish-white, 1.5-2 mm long, glabrous, the tepals dimorphic, the outer whorl of tepals obovate to orbicular, those of the inner whorl lanceolate; achenes light brown, 2-2.5 mm long.---Locally common in Washington Co.; w. across Nev. to Calif. and s. to central Ariz.

VAR. *SUBRACEMOSUM* (S.Stokes) Reveal. [*E. howellii* var. *s.* S. Stokes.] Low shrub 3-6 dm high, 3-8 dm across with smooth, scabrous stems, the branches often somewhat spinelike.---Virgin Narrows in sw. Washington Co.; s. to Coconino Co., Ariz. Aug-Sep.

VAR. *SULCATUM* (S.Wats.) Munz & Reveal. [*E.s.* S.Wats. *E.h.* ssp. *s.* S.Stokes.] Low subshrubs 1-4 dm high, 1.5-6 dm across with angled or ribbed stems.---Locally common in Washington Co.; w. across s. Nev. to e. Calif. and s. to nw. Ariz. Jul-Sep.

18. *E. PLUMATELLA* Dur. & Hilg. [*E. palmeri* S.Wats.] Open erect shrubs 3-6 dm high, 3-8 dm across; leaves oblanceolate to oblong-lanceolate, 6-15 mm long, 2-4 mm wide, tomentose, the margin entire, the petiole 1-5 mm long; stems stout, tomentose; involucre turbinate, 2-2.5 mm long, 1.5-2 mm wide, glabrous, the 5 rounded teeth 0.4-0.6 mm long; flowers pale-yellow to white, 2-2.5 mm long,

glabrous, the tepals slightly dimorphic, those of the outer whorl obovate, those of the inner whorl oblong; achenes light brown to brown, 2.5-3 mm long.---Reportedly obtained from sw. Utah, most likely Washington Co., in the 1870s; s. Nev. and w. Ariz. w. to se. Calif. Aug-Nov.

19. *E. BREVICAULE* Nutt. Spreading herbaceous perennials 1-5 dm high, 0.5-4 dm across; leaves linear, oblanceolate, elliptic or spatulate, (1.5) 3-7 (10) cm long, 1-7 mm wide, densely tomentose below, less so to floccose or even glabrous and green above, the margin entire or crenulate, flat or revolute, the petiole 0.3-2 (4) cm long; stems (0.5) 1-2 (2.5) dm long, tomentose to floccose or glabrous; inflorescences cymose to capitate or umbellate, (1) 3-10 (25) cm long, 1-10 (15) cm wide, tomentose to glabrous; peduncles, when present, up to 3 cm long, erect, glabrous; involucre solitary or clustered, turbinate to turbinate-campanulate, 2-4 mm long, (1) 1.5-2.5 (3) mm wide, tomentose to glabrous, the 5 acute teeth 0.3-1 mm long; flowers yellow to cream or white, 2-4 mm long, glabrous, the tepals oblong to obovate or ovate to oval; achenes light brown, 2-3 mm long.---Central and n. Utah n. to sw. Ida. e. to Wyo. and Colo. Jun-Sep.

The *Eriogonum brevicaule* complex is a rather difficult group of species which are not yet fully understood. In 1969, a number of discordant elements were included in the definition of var. *brevicaule* and are here still retained. Since then, field work has shown other, equally interesting, populations exist which have not been given formal recognition in the past, and would have to be if one decided to attempt a fragmentation of the variety into additional entities.

Some forms which are worthy of formal recognition are not announced at this time primarily due to a paucity of material. One, a new species, was collected by M.E. Jones in eastern Utah in two locations, but repeated attempts to discover this plant has resulted in failure. This plant has yellow flowers, a cymose-umbellate inflorescence with tomentose to floccose stems and branches and broadly elliptical leaves 1-2 cm long and 8-12 mm wide. Jones collected it near Moab, Grand Co. and Mounds, in Carbon Co. A new variant of *Eriogonum brevicaule* is also known, but until studied in the field, no formal recognition is proposed.

#### KEY TO THE VARIETIES

- A. Flowers yellow, or if cream, then stem pubescent.
    - B. Stems glabrous; inflorescence cymose. *var. brevicaule*
    - BB. Stems floccose to tomentose, or if glabrous, then inflorescences capitate.
      - C. Inflorescences cymose; flowers yellow. *var. cottamii*
      - CC. Inflorescences capitate or subcapitate to umbellate; flowers yellow to cream. . . . *var. laxifolium*
    - AA. Flowers white; inflorescences cymose. *var. wasatchense*
- VAR. *BREVICAULE*. [*E. campanulatum* Nutt. *E. confertiflorum* var.

*stansburyi* Benth. in DC. *E. c. ssp. b.* S.Stokes. *E. nudicaule* ssp. *garrettii* S.Stokes. *E.n. ssp. parleyense* S.Stokes. *E.b. ssp. c.* S. Stokes.] Plants (1.5) 2-4 (5) dm high; leaves linear to oblanceolate, 3-10 cm long, 1-7 mm wide, tomentose below, less so to glabrous above, flat or revolute; stems 1-2.5 dm long, glabrous; inflorescences cymose, (3) 5-25 cm long; involucre turbinate, 2-4 mm long, (1) 1.5-2.5 mm wide, glabrous; flowers yellow, 2.5-3 mm long.---Common throughout much of n. Utah from the valley floors to the mountain passes of the Wasatch and Uinta mountains; se. Ida. e. to e. Wyo. s. to n. Colo. Jun-Sep.

VAR. COTTAMII (S.Stokes) Reveal. [*E. tenellum* ssp. *c.* S.Stokes.] Plants 1-1.5 dm high; leaves narrowly oblanceolate to narrowly elliptic, 3-7 cm long, 3-5 mm wide, brownish-tomentose, the margin flat; stems 0.5-1 dm long, tomentose; inflorescences 3-10 cm long, tomentose, cymose; involucre turbinate, 2-3 mm long, 1.5-2 (2.5) mm wide, tomentose; flowers yellow, 3-4 mm long.---Infrequent on clay hills and limestone outcrops in w-central Utah from Utah and Juab cos. s. to n. Millard Co. Endemic. Jul-Sep.

VAR. LAXIFOLIUM (Torr. & Gray) Reveal. [*E. kingii* var. *l.* Torr. & Gray. *E. chrysocephalum* A.Gray. *E.l. A.Nels. E. ochrocephalum* var. *angustum* M.E. Jones. *E.b. var. pumilum* Stokes ex Jones. *E. medium* Rydb. *E. nudicaule* ssp. *a.* S.Stokes. *E.n. ssp. p.* S.Stokes.] Plants (0.5) 1-2 dm high; leaves linear to narrowly oblanceolate, (1.5) 3-7 cm long, 1.5-5 mm wide, tomentose below, floccose to glabrous above, the margin flat or revolute; stems (0.5) 1-2 dm long, tomentose to floccose or rarely glabrous; inflorescences capitate to subcapitate or umbellate, tomentose to floccose or rarely glabrous; involucre clustered, turbinate, 3-4 mm long, 2-3 mm wide, tomentose to glabrous; flowers yellow to cream, 2.5-3.5 mm long.---Common across n. Utah from desert ranges and valley floors up to 10,000 feet atop the Wasatch Plateau; se. Ida. and sw. Wyo. Jul-Sep.

This complex variant is now defined to contain two elements, which, when their extremes are viewed, are vastly different. The low, compact to nearly caespitose alpine (or clay-hills and flats) phase formally called var. *laxifolium* or *E. chrysocephalum* can be quickly distinguished from the mid-elevation (or clay-hills and flats, also of the lower elevations) phase normally called var. *pumilum*. However, in much of eastern Utah Co. and adjacent parts of Duchesne, Summit and Carbon cos., the two can not be distinguished except artificially on the bases of a capitate versus a subcapitate or umbellate inflorescence. As a result, the variant is defined to include both extremes.

VAR. WASATCHENSE (M.E. Jones) Reveal. [*E.w.* M.E. Jones.] Plants 3-5 dm high; leaves narrowly elliptic, 1.5-4 cm long, (3) 4-7 mm wide, tomentose below, floccose above, the margin flat, crenulate; stems 1-3 dm long, glabrous; inflorescences cymose, (8) 10-15 cm long, glabrous; involucre turbinate, 3-4 mm long, 2-2.5 mm wide; flowers white, 2-2.5 mm long.---In the mountains and along the w.

slope of the Wasatch Mts. from n. Sevier Co. n. to Davis Co. Endemic. Jul-Sep.

20. *E. SPATHULATUM* A.Gray. [*E. nudicaule* ssp. *ochroflorum* S. Stokes.] Erect to spreading herbaceous perennials 1.5-4 dm high, 1-4 (5) dm across; leaves lanceolate to narrowly elliptic, 1-4 (6) cm long, 3-10 mm wide, tomentose, the margin flat, the petiole 5-15 mm long; stems erect, 1-2 dm long, tomentose; inflorescences cymose, 3-10 cm long and wide, tomentose; involucre clustered, turbinate-campanulate, 2-3 (3.5) mm long, 2-2.5 (3) mm wide, tomentose, the 5 acute teeth 0.5-0.8 mm long; flowers cream to pale yellow, 2.5-3.5 mm long, glabrous, the tepals oblong; achenes brown, 3-3.5 mm long.---Low rolling clay hills in s. Sevier Valley of San Pete and Sevier cos., and in e. Millard and Beaver cos. s. to Iron Co. Endemic. Jul-Oct.

21. *E. LOGANUM* A.Nels. [*E. chrysocephalum* ssp. *l.* S.Stokes.] Spreading herbaceous perennials 1.5-3 dm high, 2-4 dm across; leaves oblanceolate to narrowly elliptic, 2-5 (7) cm long, 3-7 mm wide, tomentose, the margin flat, the petiole 1-2.5 (3) cm long; stems erect, 1-2.5 dm long, lanate to tomentose; inflorescences capitate; involucre clustered, turbinate, 3.5-4.5 mm long, 2.5-3 mm wide, floccose to tomentose, the 5 acute teeth 0.5-1 mm long; flowers cream to yellow, 2.5-3.5 (4) mm long, glabrous, the tepals oblong to obtuse; achenes brown, 3-3.5 mm long.---Clay bluffs and hills in Cache Valley, Cache Co. Endemic. May-Jul.

22. *E. CONTORTUM* Small ex Rydb. [*E. effusum* ssp. *c.* S.Stokes.] Low herbaceous perennials 5-8 (10) cm high, 8-25 cm across; leaves linear to linear-ob lanceolate, (0.5) 1-2 cm long, 1.5-2 (2.5) mm wide, tomentose below, floccose above, the margin revolute, the petiole 1-2 mm long; stems erect, 2-6 cm long, floccose; inflorescences cymose, 1-3 cm long, 0.8-2 cm wide, floccose to glabrous; peduncles up to 1 cm long, erect, floccose to glabrous; involucre turbinate to turbinate-campanulate, 1.5-2 (2.5) mm long, 1-2 mm wide, glabrous, the 5 acute teeth 0.3-0.5 mm long; flowers yellow, 1.5-2 (2.5) mm long, glabrous, the tepals oblong to obovate; achenes brown, 2-2.5 mm long.---Low rolling clay hills of Grand Valley of eastern Grand Co. e. to Mesa Co., Colo., also reported from Garfield Co. May-Aug.

23. *E. VIRIDULUM* Reveal. Erect to spreading herbaceous perennials 1-3.5 dm high, 1-4 dm across; leaves linear to narrowly elliptic, 1-3 (4) cm long, 1-2 (5) mm wide, tomentose below, glabrous above, the margin revolute, the petiole 1-1.5 (2) mm long; stems erect, 5-12 cm long, glabrous and bright green; inflorescences dense, cymose, 3-15 cm long, 2-8 cm wide, glabrous; peduncles, when present, up to 2 mm long, erect, glabrous; involucre turbinate, 2-3 mm long, 1.5-2 mm wide, glabrous, the 5 acute teeth 0.4-0.6 mm long; flowers yellow, 1.5-2 mm long, glabrous, the tepals ovate-oblong, those of the inner whorl slightly narrower; achenes brown,

1.5 mm long.---Clay hills and flats in Duchesne and Uintah cos.; nw. Colo. Jul-Sep.

24. *E. EPHEDROIDES* Reveal. Erect herbaceous perennials 2-3.5 dm high, 2-3 (4) dm across; leaves lanceolate, 1.5-2.5 cm long, 2-3 mm wide, tomentose below, subglabrous to glabrous above, the margin flat, the petiole 5-10 mm long; stems erect, 1-2 dm long, glabrous; inflorescences narrowly cymose, strict, 1.5-2.5 dm long, 0.5-1.5 dm wide, glabrous; peduncles erect, 5-15 mm long at the lower nodes, shorter above or lacking entirely, glabrous; involucre turbinate, 2-2.5 mm long, 1-1.5 mm wide, glabrous, the 5 acute teeth 0.4-0.5 mm long; flowers white to pale-yellow, 2-2.5 mm long, glabrous, the tepals lanceolate; achenes brown, 2 mm long.---Infrequent on white shale outcrops in e. Uintah Co. s. of Bonanza; nw. Colo. Jul-Sep.

25. *E. HUMIVAGANS* Reveal. Spreading herbaceous perennials 2-3 dm high, 2-4 dm across; leaves oblanceolate, 1.5-3 cm long, 2-5 (7) mm wide, tomentose below, less so and greenish above, the margin flat, the petiole 5-10 (12) mm long; stems weakly erect, 8-15 cm long, glabrous; inflorescences cymose, 6-15 cm long, 3-10 cm wide, glabrous; involucre turbinate, 3-4 mm long, 2-2.5 mm wide, glabrous, the 5 acute teeth 0.5-0.7 mm long; flowers white, 3-3.5 mm long, glabrous, the tepals obovate; achenes light brown, 2.5-3 mm long.---Known only from low clay hills e. of Monticello, San Juan Co. Endemic. Jul-Sep.

26. *E. INTERMONTANUM* Reveal. Spreading herbaceous perennials 1.5-3 dm high, 1-3 dm across; leaves narrowly lanceolate, (2) 3-5 cm long, 2-4 mm wide, tomentose below, floccose to subglabrous above, the margin flat, the petiole 1-2 cm long; stems erect, 1-1.5 dm long, glabrous; inflorescences cymose, 2-10 cm long, (4) 8-20 cm wide, glabrous; involucre clustered, turbinate-campanulate, 2.5-3.5 (4) mm long, 2-3 (4) mm wide, glabrous, the 5 acute teeth 0.4-0.7 mm long; flowers white, 2-3 mm long, glabrous, the tepals obovate; achenes brown, 2.5-3 mm long.---Dry sandy-loam places atop the Roan Cliffs, Grand Co. Endemic. Jun-Aug.

A highly variable plant found in Colorado and northern New Mexico might occur in eastern Utah. This is *E. lonchophyllum* Torr. & Gray, and may be distinguished (usually) by its revolute leaves 2-15 (20) cm long, white flowers 2-4 mm long, glabrous stems and branches. It resembles *E. brevicaulis* in some aspects but would most likely "key" to *E. humivagans* or *E. intermontanum*.

27. *E. THOMPSONAE* S.Wats. Spreading herbaceous perennials 2-4 dm high and 2-5 dm across, or spreading subshrubs 3-5 dm high and 3-6 dm across; leaves oblong to oblanceolate or elliptic, (2) 3-4.5 (5) cm long, 8-15 mm wide, tomentose below, glabrous or nearly so above, the margin flat, the petiole 3-7 cm long; stems erect, 12-25 cm long, glabrous; inflorescences open, cymose, 1-3 dm long and wide, glabrous; involucre turbinate, 2-3 (3.5) mm long, 1-1.5 (2)

mm wide, glabrous, the 5 acute teeth 0.4-0.5 mm long; flowers yellow or white, 3-3.5 mm long, glabrous, the tepals oblong to obovate; achenes light brown to brown, 2.5-3 mm long.---Clay hills and flats in s. Washington and Kane cos.; n. Ariz. Jul-Nov.

VAR. THOMPSONAE. Flowers yellow.---Infrequent to rare on clay hills near Kanab, Kane Co.; s. and w. in Mohave Co. to w. of Pipe Springs, Ariz. Jul-Nov.

VAR. ALBIFLORUM Reveal. Flowers white.---Infrequent on clay hills near Hurricane, Washington Co. Endemic. Jul-Nov.

Near the east gate to Zion National Park at Springdale, this variety becomes subshrubby and resembles forms of *E. corymbosum* in general aspect, but differs on leaf features and pubescence. On nearby hills, "normal" var. *albiflorum* can be found, but caution must be used in this matter as the variant would most likely key to *E. corymbosum* in most treatments.

28. *E. OSTLUNDII* M.E. Jones. [*E. spathuliforme* Rydb. *E. tenellum* ssp. *o.* S.Stokes. *E. spathulatum* ssp. *s.* S.Stokes.] Spreading herbaceous perennials 2-3.5 (4) dm high, 1-3 dm across; leaves elliptic to spatulate, 1-3 cm long, 5-8 (10) mm wide, tomentose below, less so to floccose above, the margin flat, the petiole 1-2 cm long; stems erect, 8-15 cm long, glabrous; inflorescences open, cymose, 5-25 cm long, 5-15 cm wide, glabrous; peduncles, when present, up to 1 cm long, erect, glabrous; involucre turbinate to turbinate-campanulate, 2-2.5 mm long, 1.8-2 (2.2) mm wide, glabrous, the 5 acute teeth 0.5-0.8 mm long; flowers white, 1.5-2.3 mm long, glabrous, the tepals obovate, those of the inner whorl slightly narrower; achenes light brown, 2.5-3 mm long.---Pinyon-juniper covered clay hills and slopes in Piute and Sevier cos. mainly along the Sevier River. Endemic. (May) Jun-Sep.

29. *E. EREMICUM* Reveal. Spreading herbaceous perennials 2.5-4.5 dm high, 1-2.5 dm across; leaves ovate to rounded, 1.2-2 cm long, 1-1.7 cm wide, finely tomentose on both surfaces, the margin flat, the petiole 1-2.5 cm long; stems erect, 5-20 cm long, glabrous; inflorescences open, cymose, 12-25 cm long, 1-2 dm across, glabrous; involucre clustered or infrequently solitary on the same plant, turbinate, 2.5-4 mm long, 2-2.5 mm wide, glabrous, the 5 acute to rounded teeth 0.4-0.8 mm long; flowers white, 2.5-3 mm long, glabrous, the tepals obovate, those of the inner whorl slightly narrower; achenes light brown to brown, 3 mm long.---Clay and limestone rolling hills and flats in sw. Millard Co. e. of Garrison, e. of Robisons Ranch and near the Desert Range Experiment Station. Endemic. Jun-Sep.

30. *E. BATEMANII* M.E. Jones. Spreading herbaceous perennials (1) 1.5-3.5 (4) dm high, 1-2.5 dm across; leaves elliptic, (1) 1.5-3 cm long, 6-10 (12) mm wide, tomentose on both surface or slightly less so above and floccose, the margin flat, the petiole 8-20 mm long; stems erect, 1-2 dm long, glabrous; inflorescences cymose,

5-15 cm long and wide, glabrous; involucre solitary or clustered, turbinate, 2-4 mm long, 1.5-2.5 mm wide, glabrous, the 5 acute teeth 0.5-0.8 mm long; flowers white, 1.5-2.8 mm long, glabrous, the tepals obovate; achenes light brown to brown, 2.5-3 mm long. ---Clay hills and slopes of ne. Utah from Duchesne and Uintah cos. s. to Garfield Co.; e. into extreme w. Colo. Jun-Sep.

31. *E. CRONQUISTII* Reveal. Low spreading herbaceous perennials (0.7) 1-1.5 (2) dm high, 3-8 dm across; leaves elliptic, 0.5-2 cm long, 4-10 mm wide, tomentose below, subglabrous above, the margin crenulate, the petiole 3-8 mm long; stems erect or nearly so, 5-10 cm long, glabrous; inflorescences subcapitate to cymose, up to 7 cm long and wide, glabrous; involucre solitary or clustered, turbinate, 3 mm long, 2-2.5 mm wide, glabrous, the 5 acute teeth 0.6-1 mm long; flowers white, (1.5) 2-3 mm long, glabrous, the tepals slightly dimorphic, those of the outer whorl oblanceolate, those of the inner whorl narrowly oblanceolate and about half as wide; achenes light brown, 2-2.5 mm long. ---Known only from a single talus slope on Bull Mtn., Henry Mts., Garfield Co. Endemic. Jul-Sep.

32. *E. RACEMOSUM* Nutt. Tall erect herbaceous perennials 3-8 (10) dm high; leaves elliptic to ovate or oval, (1.5) 2-6 (10) cm long, 1-2.5 (3.5) cm wide, lanate to tomentose below, floccose to glabrate or glabrous above, the petiole (2) 3-10 (15) cm long; stems erect, 1-3 (5) per plant, (1) 1.5-2.5 (3) dm long, tomentose to floccose; inflorescences cymosely branched with the virgated branches bearing 5-20 or more racemosely arranged involucre, 1.5-5 dm long, divided (2) 3-7 (10) times, tomentose to floccose; peduncles, when present, erect and up to 4 cm long, tomentose to floccose; involucre turbinate-campanulate, (2) 3-5 mm long, (2) 2.5-4 mm wide, tomentose to floccose, the 5 acute 0.1-0.5 mm long; flowers white to greenish- or brownish-white with greenish to reddish midribs and bases, often becoming pink to rose in fruit, (2) 2.5-5 mm long, glabrous, the tepals oblong-oblanceolate; achenes light brown, 3-4 mm long. ---Common in various mid-elevation locations throughout the mountains and foothills of Utah except for the n-most portion; c. Nev. e. to w. and s. Colo., n. Ariz. and n. N.M. Jul-Oct.

Several minor phases can be recognized in this species throughout its range, and a few occur in Utah. The plants in Utah Co. northward to Salt Lake Co. are particularly distinct, but as the whole lot tends to blend from one extreme to another, it seems inappropriate to attempt to distinguish any facet of the species.

33. *E. ZIONIS* J.T. Howell. Suberect to erect herbaceous perennials 3-6 dm high, often leaning on other vegetation for support; leaves oblong-ovate to ovate, 2-4.5 cm long, 1.5-2.5 (3) cm wide, lanate to tomentose below, thinly floccose to glabrous above, the petiole 3-6 (8) cm long; stems  $\pm$  erect, 1-3 per plant, 1-2.5 dm long, often fistulose, glabrous and green; inflorescences narrow, cymosely branched with the virgated branches containing 8-15 race-

mosely arranged involucre, 2-4.5 dm long, divided 2-5 times, glabrous; involucre turbinate to turbinate-campanulate, 1.5-3 mm long, 1.5-2.5 mm wide, tomentose, the 5 rounded teeth 0.2-0.4 mm long; flowers white to greenish- or yellowish-white with greenish to reddish midribs and bases, 2-3.5 (4) mm long, glabrous, the tepals oblong; achenes light brown, 3-4 mm long.---Infrequent to rare in sandy soil in Zion National Park, Washington and Kane cos. Endemic. Sep-Nov.

To the south, on the rim of the Grand Canyon, a variant occurs. The var. *coccineum* J.T. Howell may be distinguished by its larger scarlet flowers and narrower leaves. An unusual glabrous plant which may be *E. racemosum* has been seen from south of Flagstaff, but its relationship to *E. zionis* (if any) has not yet been determined.

34. *E. GRAYI* REVEAL. Low pulvinate and cespitose herbaceous perennials forming mats up to 2 dm across; leaves narrowly oblanceolate to narrowly elliptic, 0.5-1.5 (2) cm long, 2-4 mm wide, white-tomentose below, thinly floccose or more commonly glabrous and green above, the margin crenulate, the petiole 2-5 mm long; stems scapose, 0.4-15 cm long, glabrous or sparsely floccose; inflorescences capitate; involucre congested, turbinate, 2-3 mm long, 2-2.5 mm wide, glabrous, the 5 acute teeth 0.4-0.7 mm long; flowers bright yellow, 1.5-2.5 mm long, glabrous, the tepals lanceolate; achenes brown, 2-2.5 mm long.---Alpine regions of n-central Utah from Mt. Nebo n. to the Alta area, and onward in very scattered locations to s. Box Elder Co., mostly above 10,000 feet elevation. Endemic. Jun-Sep.

*Eriogonum grayi* Reveal, *sp. nov.*--Plantae humiles compactae perennes crassas tegetes formantes; folia anguste oblanceolata vel anguste elliptica, 0.5-1.5 (2) cm longa, 2-4 mm lata, laminis subtus albo-tomentosis, supra subglabris vel glabris et viridibus, petiolis 2-5 mm longis; scapi erecti, 0.4-15 cm longi, glabri vel parce floccosi; involucre rigida, turbinata, 2-3 mm longa, 2-2.5 mm lata, glabra, 5-lobata; flores lutei, 1.5-2.5 mm longi, glabri, tepalis lanceolatis; achaenia 2-2.5 mm longa. Typus: UTAH: Salt Lake Co., Lake Blanche, 15 Aug 1947, Holmgren et al. 7121. Holotypus, UTC! Isotypus, UC!

This new species is what has been generally called *Eriogonum chrysocephalum* in northern Utah (but not elsewhere). Asa Gray first attempted to describe the species, but cited the earlier name *E. kingii* var. *laxifolium* as a synonym, thus making *E. chrysocephalum* merely a new name for the variant. The new species is clearly related to those species centering around *E. brevicaule*, and like so many of the species of Sec. Capitata, can be traced back to a mid- or low elevation species of the *E. brevicaule* group. Both *E. grayi* and *E. desertorum* can be so traced, with the first most likely coming from some phase of var. *brevicaule* with the second a modification of *E. brevicaule* var. *laxifolium*. It is difficult to always distinguish *E. grayi* from some facets of var. *laxifolium* that occur on the Wasatch Plateau, but the key should provide a

ready means of discrimination between the various Utah entities.

35. *E. NANUM* Reveal. Low pulvinate and cespitose herbaceous perennials forming mats up to 2 dm across; leaves broadly elliptic, 3-10 mm long, 2-4 (5) mm wide, white-tomentose below, subglabrous to glabrous and green above, the margin crenulate, the petiole 1-3 mm long; stems scapose, 6-12 cm long, glabrous; inflorescences capitate; involucre congested, turbinate, 1.5-2.5 mm long, 1-2 mm wide, glabrous, the 5 acute teeth 0.3-0.5 mm long; flowers greenish-white to pale yellowish-white, 2-3 mm long, the tepals lanceolate; achenes light brown to brown, 2-2.5 mm long.---Known only from the Willard Peak area of Box Elder Co. Endemic. Jul-Sep.

*Eriogonum nanum* Reveal, *sp. nov.*--Plantae humiles compactae perennes crassas tegetes formantes; folia late elliptica, 3-10 mm longa, 2-4 (5) mm lata, laminis subtus albo-tomentosis, supra subglabris vel glabris et viridibus, petiolis 1-3 mm longis; scapi erecti, 6-12 cm longi, glabri; involucre rigida, turbinate, 1.5-2.5 mm longa, 1-2 mm lata, glabra, 5-lobata; flores eburnei, 2-3 mm longi, glabri, tepalis lanceolatis; achaenia 2-2.5 mm longa. *Typus:* UTAH: Box Elder Co., on talus slopes and limestone outcrops south of Willard Peak, toward Ben Lomond Peak, on the ridge and adjacent slopes southeast of the radio tower above a small reservoir, at 9500 feet elevation, 31 Aug 1964, *Reveal & Holmgren 665*. *Holotypus*, US! *Isotypi*, ARIZ, BRY, CAS, DS, GH, KANS, MO, NY, OKL, OSC, RM, RSA, UC, UT, UTC, WTU, distributed as *E. chrysocephalum* A.Gray.

This new species has been known to me for some time, but always looked upon as a mere variant of *E. grayi*. However, attempts to discover what the origin of *E. nanum* might have had, it could not be traced to *E. grayi*, nor, for that matter, to any of the facets of *E. brevicaulis*. It is still impossible to assign a proposed origin of the new species, but current ideas seem to suggest that one might wish to look into some of the species which occur to the north and west with membranaceous involucre. However, this seems most unlikely based on the understanding of the species in the Sec. Capitata now at hand.

36. *E. DESERTORUM* (Maguire) R.J. Davis. [*E. chrysocephalum* ssp. d. Maguire.] Low cespitose herbaceous perennials forming small mats 0.7-1.8 (2) dm across; leaves elliptic to broadly elliptic, 1-2.5 (3) cm long, (3) 5-8 (9) mm wide, densely white-tomentose on both surfaces, the margin entire, the petiole 0.5-1.5 cm long; stems scapose, (2) 3-6 cm long, tomentose; inflorescences capitate; involucre congested, turbinate to turbinate-campanulate, 2.5-4 mm long, 2.5-3.5 mm wide, tomentose, the 5 (8) acute teeth 0.5-0.8 mm long; flowers bright yellow with greenish-yellow midribs and bases, becoming tinged with rose in some, 2.5-3 mm long, glabrous, the tepals lanceolate; achenes brown, 2.5-3 mm long.---Dry sagebrush slopes and hills in extreme nw. Utah in Tooele and Box Elder cos.; ne. Nev. and s-central Ida. Jun-Aug.

This species closely resembles the low elevation desert populations of *E. brevicaulis* var. *laxifolium* of western Utah; the two can

be separated with some difficulty in the key.

37. *E. PANGUICENSE* (M.E. Jones) Reveal. Low pulvinate to cespitose herbaceous perennials forming mats 0.5-2 dm across; leaves narrowly oblanceolate, 0.5-6 (7) cm long, 2-4 (5) mm wide, white-tomentose below, floccose to subglabrous and green above, the margin entire or crenulate, occasionally inrolled, the petiole 1-4 (8) mm long; stems scapose, 2-30 cm long, glabrous; inflorescences capitate; involucre congested, turbinate, (2) 2.5-3 mm long, 1.5-2.3 mm wide, glabrous, the 5 rounded teeth 0.3-0.5 mm long; flowers white, 2-3 mm long, glabrous, the tepals obovate to oblong-obovate; achenes light brown, 3-4 mm long.---Clay slopes and hills of s-central and sw. Utah from Sevier Co. s. to Washington and Kane cos. Endemic. Jun-Sep.

VAR. *PANGUICENSE*. [*E. pauciflorum* var. *p.* M.E. Jones. *E. spathulatum* var. *p.* S.Stokes.] Mats 0.5-1.3 (1.5) dm across; leaves 1.5-6 (7) cm long, the margin entire, on petioles 2-8 mm long; scapes 8-25 (30) cm long; flowers 2-2.5 mm long; achenes 3-3.5 mm long.---Infrequent on clay hills from Sevier Co. s. to Washington and Kane cos. Jun-Sep.

VAR. *ALPESTRE* (S.Stokes) Reveal. [*E. chrysocephalum* ssp. *a.* S. Stokes.] Mats 1-2 dm across; leaves 0.5-1.5 cm long, the margin mostly crenulate, on petioles 1-4 mm long; scapes 2-7 cm long; flowers (2) 2.5-3 mm long; achenes 3.5-4 mm long.---Whitish clay outcrops on the upper rim of Cedar Break and near the base of Brian Head, Iron Co. Jul-Sep.

38. *E. VILLIFLORUM* A.Gray. Loosely cespitose herbaceous perennials with 10-20 rosettes of leaves forming indistinct mats 1-6 cm across; leaves narrowly elliptic, 4-9 mm long, (0.9) 1-1.8 (2) mm wide, silky-tomentose on both surfaces, the margin often slightly thickened, the petiole short 0.5-0.8 mm long; stems scapose or nearly so, 2-5 (8) cm long, villous, prostrate; inflorescences subcapitate to cymose-umbellate, 5-12 mm across; peduncles, when present, less than 1.5 mm long, villous; involucre campanulate, 4-5 mm long, villous, the 6-10 lobes 2-3 mm long; flowers white, maturing rose or rustic, 3-4.5 mm long, densely pilose without, sparsely so within, the tepals oblanceolate to oblong; achenes light brown, 2.3-2.5 mm long, glabrous.---Dry gravelly or clay hills of w. Utah, from Millard Co. s. to Kane Co.; e. Nev. Apr-Jul.

39. *E. TUMULOSUM* (Barneby) Reveal. [*E. villiflorum* var. *t.* Barneby] Low cespitose pulvinate herbaceous perennials with several hundred rosettes of leaves forming rounded, hummock-like mats 1-4 dm across; leaves oblanceolate to elliptic, 3-4 mm long, 0.7-1 mm wide, silky-tomentose on both surfaces, the margin often slightly thickened, the petiole 0.4-0.7 mm long; stems scapose, 1-9 mm long, villous, erect; inflorescences capitate; involucre campanulate, 2-4 mm long, (4) 5-8 mm wide, villous, the 7-10 lobes 1.6-2.2 mm long; flowers white, maturing rose or rustic, 3-4 mm long, densely

pilose without, sparsely so within, the tepals oblong to oblong-ob lanceolate; achenes light brown, 2 mm long, glabrous.---Dry clay hills and flats, gravelly slopes and sandstone ledges of e. Utah in central Duchesne and in n. Emery cos. Endemic. May-Jul.

40. *E. ARETIOIDES* Barneby. Low caespitose pulvinate herbaceous perennials with 20-50 rosettes of leaves forming small low mounds 7-14 cm across; leaves oblanceolate, 1-3.5 mm long, 0.9-1.2 mm wide, silky-pilose, the margin thickened or revolute, the petiole 0; stems 0; inflorescences reduced to a single involucre; involucre campanulate, 2.8-3.2 mm long, 3-4 mm wide, villous, the 4 lobes 1-1.5 mm long; flowers yellow, 2-2.2 mm long, densely pilose without, glabrous within, the tepals lance-ovoid; achenes brown, 2 mm long, glabrous.---Rare and local in Red Canyon and near Widtsoe, Garfield Co. Endemic. May-Jul.

This buckwheat is one of the rarest in Utah and remains one of the most endangered as the heavy recreation use of the Bryce Canyon area increases.

41. *E. SHOCKLEYI* S.Wats. Low pulvinate herbaceous perennials forming flat to rounded mats 1-4 dm across; leaves oblanceolate to elliptic or spatulate, (2) 3-8 (12) mm long, 2-4 (6) mm wide, tomentose below, often slightly less so above, the margin plane to slightly thickened, the petiole 2-5 mm long; stems scapose, up to 3 cm long, floccose to tomentose, erect; inflorescences capitate; involucre congested, campanulate, (2) 2.5-5 (6) mm long, 3-6 (7) mm wide, floccose to tomentose, the 5-10 lanceolate lobes (0.5) 1-3 mm long; flowers white with reddish or rusted midribs, bases and margins, becoming rose to red or rustic with age, or yellow with greenish midribs and bases, 2.5-4 mm long, densely pilose without, glandular within, the tepals oblong to obovate; achenes light brown to brown, 2.5-3 mm long, pubescent.---Clay hills and flats in w. Utah and in e. Utah; e. Calif. e. to s. Ida. and w. Colo. and s. to n. Ariz. and nw. N.M. May-Jul.

VAR. *SHOCKLEYI*. [*E. pulvinatum* Small. *E. villiflorum* var. *candidum* M.E. Jones. *E. acaule* var. *s.* M.E. Jones. *E.s.* ssp. *c.* S. Stokes.] Mats 1-2.5 dm across; leaves elliptic, 2-6 mm long, 2-4 mm wide; stems up to 2 cm long, floccose to tomentose; involucre 2-3.5 mm long, the lobes 0.5-1.5 (2) mm long; flowers white or pale yellow to yellow, 2.5-4 mm long; achenes sparsely pubescent.---The common phase of the species in w. Utah; e. Calif. to s. Ida. and w. Utah. May-Jul.

VAR. *LONGILOBUM* (M.E. Jones) Reveal. [*E.l.* M.E. Jones. *E. acaule* var. *l.* M.E. Jones. *E.s.* ssp. *l.* S.Stokes.] Mats (1) 2-4 dm across; leaves oblanceolate to spatulate, (3) 5-8 (12) mm long, (2) 3-6 mm wide; stems up to 3 cm long, tomentose; involucre (3) 4-6 mm long, the lobes (1) 2-3 mm long; flowers white, 3-4 mm long; achenes densely pubescent.---The common phase of the species in e. Utah; w. Colo. s. to n. Ariz. and nw. N.M. May-Jul.

42. *E. OVALIFOLIUM* Nutt. Low matted puvinate to cespitose herbaceous perennials forming mats (0.5) 1-4 dm across; leaves oblanceolate to elliptic or spatulate, oblong to obovate or oval to round, 0.2-6 cm long, (1) 2-15 mm wide, tomentose on both surfaces or somewhat less so above, the margin flat, the petiole up to 1 dm long; stems scapose, 0.3-30 cm long, lanate to floccose; inflorescences capitate; involucre solitary or congested, turbinate to turbinate-campanulate, (2) 3.5-5 (6.5) mm long, 2-4 mm wide, tomentose to floccose, the 5 acute to rounded teeth up to 1 mm long; flowers white, cream or brownish maturing pinkish, rose, red, or purple, or yellowish to yellow, (2.5) 3-6 (7) mm long, glabrous, the tepals dimorphic, those of the outer whorl oval to orbicular, those of the inner whorl lanceolate to elliptic and somewhat longer; achenes light brown to brown, 2-3 mm long.---Widespread throughout much of the state from the low desert valleys to the high mountains of extreme w. and nw. Utah; sw. Can. and w. U.S. Apr-Aug.

VAR. *OVALIFOLIUM*. [*Eucycla o.* Nutt. *Eucycla purpurea* Nutt. *E. purpureum* Benth. in DC. *E.o.* var. *p.* Durand. *E. dichroanthum* Gand. *E.o.* var. *utahense* Gand. *E.o.* ssp. *p.* S.Stokes.] Mats 2.5-4 dm across; leaves mostly obovate to oval or rounded, 0.5-2 cm long, the petiole (3) 5-15 mm long; flowers white to cream or brownish, maturing pinkish to rose or purplish, 4-5 mm long.---Common in the state in the low and mid-elevations; w. U.S. and Can. Apr-Jul.

VAR. *MULTISCAPUM* Gand. [*E.o.* var. *celsum* A.Nels. *E. orthocaulon* Small. *E.o.* var. *orthocaulon* C.L. Hitchc.] Mats 2-4 dm across; leaves elliptic to spatulate or oblong, 3-6 cm long, the petiole 3-8 (10) cm long; flowers pale-yellow to yellow, 4-7 mm long.---Rather common in the n. half of the State in low and mid-elevations; sw. Wyo. and w. Colo. w. across Utah and Nev. into e. Calif. s. Ida. and se. Ore. Apr-Jun.

VAR. *NIVALE* (Canby in Cov.) M.E. Jones. [*E.n.* Canby in Cov. *E. rhodanthum* Nels. & Kenn. *E. roseiflorum* Gand. *E. eximium* Tidestr. *E.o.* ssp. *e.* S.Stokes.] Low cespitose mats 0.5-3 dm across; leaves mostly rounded, 2-8 mm long and wide, the petiole 1-8 mm long; stems 0.3-5 cm long; flowers white to cream, becoming rose to red with age, 2-3 mm long.---High mts. of w. and nw. Utah (Deep Creek and Raft River ranges) mostly above 8500 feet elevation; w. Utah w. to Sierra Nevada of Calif., n. through Ore. and Wash. to British Colum. Jul-Aug.

#### SUBGENUS OLIGOGONUM NUTT.

43. *E. UMBELLATUM* Torr. Low cespitose to pulvinate herbaceous perennials to erect or spreading subshrubs or shrubs up to 1 m high and across, the mats, when formed, up to 8 dm across; leaves oblong, elliptic, oval, spatulate, broadly obovate to suborbicular, 0.4-3 cm long, 0.4-3 cm wide, densely lanate to tomentose or glabrous on both surfaces, or frequently tomentose below and subglabrous to glabrous above, the margin flat or infrequently thickened,

the petiole 0.2-10 mm long; stems slender to stout, (3) 5-30 cm long, bractless about midlength, mostly tomentose to glabrous, inflorescences simple to compound umbellate or reduced and subcapitate to capitate, the rays usually floccose to glabrous; peduncles and rays similar and often one in the same, up to 7 cm long; involucre turbinate to campanulate, the tube 1-6 mm long, (1) 1.5-10 mm wide, thinly tomentose to slightly floccose or glabrous without, the (5) 6-10 (12) linear-lanceolate to oblong lobes 1-6 mm long, usually reflexed; flowers cream to yellow, variable in coloration, 2.5-10 mm long including the (0.7) 1.3-2 mm long stipe, glabrous, the tepals slightly dimorphic, mainly spatulate to obovate; achenes light brown to brown, 2-5 mm long, sparsely pubescent at the apex.---Widespread throughout most of the w. U.S. and sw. Can. May-Oct.

This species is highly variable and divided into more than 20 distinct variants. The nature of some of these entities is still being studied, and more will likely be suggested in the future.

#### KEY TO THE VARIETIES

- A. Primary branches of the inflorescences simple, not branched or bracteate in the middle, or if so, then flowers cream-colored and plants of n. Utah.
  - B. Flowers bright yellow.
    - C. Leaves tomentose below, floccose to glabrous above; common throughout the state. . . . . *var. umbellatum*
    - CC. Leaves glabrous on both surfaces.
      - D. Inflorescences umbellate to subcapitate, up to 3 cm long; leaves 1-2 cm long; plants up to 5 dm high; central and n. Utah. . . . . *var. aureum*
      - DD. Inflorescences capitate or nearly so, up to 1 cm long; leaves 0.5-1.5 cm long; plants up to 1 dm high; alpine regions of n. and sw. Utah. . . . . *var. porteri*
  - BB. Flowers cream to whitish or pale-yellow.
    - C. Leaves thinly tomentose to tomentose below, floccose to subglabrous or rarely glabrous above, 1-2 (2.5) cm long; inflorescences umbellate to (rarely) compoundly umbellate; flowers pale-yellow, cream or whitish, 4-8 mm long; plants from suberect to erect woody caudex branches; n. and w. Utah. . . . . *var. dichrocephalum*
    - CC. Leaves densely lanate below, thinly floccose to glabrous and olive-green to green above, (0.3) 0.5-2 (4) cm long; inflorescences umbellate; flowers cream, 3-6 mm long; plants from prostrate woody caudex branches; n. Utah. . . . . *var. majus*
- AA. Primary branches of the inflorescences compoundly branched; leaves sparsely pubescent to nearly glabrous on both surfaces; flowers bright yellow, rarely cream (in Washington Co.), 6-7 mm long; tall herbaceous perennials, sometimes subshrubby; s. half of the states. . . . . *var. subaridum*

VAR. UMBELLATUM. [*E. lateum* Small ex Rydb. *E. rydbergii* Greene. *E. cupreum* Gand.] Low mat-forming perennials up to 6 dm across; leaves tomentose below, glabrous to floccose (or rarely tomentose) above; stems up to 3 dm long; flowers bright yellow, 4-7 mm long. ---Found throughout most of the state except the se. corner; Wash. e. to Mont. s. to central Oreg., n. Nev. and Utah and Colo. Jun-Sep.

As now defined, the variety is restricted to the northern half of the United States. The California element, formally referred to var. *umbellatum* is now called var. *nevadense* Gand. [*E. reclinatatum* Greene. *E.u.* var. *californicum* Gand.].

VAR. AUREUM (Gand.) Reveal. [*E. neglectum* Greene. *E. azaleastrum* Greene. *E. umbelliferum* Small. *E. marginale* Gand. *E.u.* var. *intectum* A.Nels. *E.u.* var. *umbelliferum* S.Stokes. *E.u.* var. *glabratum* S.Stokes.] Low mat-forming to slightly erect perennials up to 6 dm across; leaves glabrous (or nearly so) on both surfaces; stems up to 3 dm long; flowers bright yellow, 4-7 mm long. ---Restricted mainly to the mountains of central and n. Utah; w. Wyo. and w. Colo. w. across Utah and Nev. to ne. Calif., se. Ore. and s. Ida. Jun-Sep.

VAR. PORTERI (Small) S.Stokes. [*E.p.* Small.] Low caespitose matted perennials up to 4 dm across; leaves glabrous on both surfaces; stems up to 1 dm high; flowers bright yellow, 4-6 mm long. ---Alpine regions of Utah from Iron Co. n. to the Uinta Mts.; ne. Nev. and Rocky Mts. of Colo. Jul-Sep.

VAR. DICHROCEPHALUM Gand. [*E. aridum* Greene. *E.u.* ssp. *a.* S. Stokes. *E.u.* var. *a.* C.L. Hitchc.] Low mat-forming to slightly erect perennials up to 6 dm across; leaves thinly tomentose to tomentose below, floccose to subglabrous or rarely glabrous and greenish above; stems up to 3 dm long; flowers pale-yellow, cream or whitish, 4-8 mm long. ---Infrequent in the desert ranges and along the w. foothills of the Wasatch Front of w. and n. Utah.; sw. Mont., w. Wyo., s. Ida. and se. Ore. s. to central Nev. and se. Calif. Jun-Aug.

VAR. MAJUS Hook. [*E. subalpinum* Greene. *E.u.* var. *s.* M.E. Jones. *E.u.* ssp. *m.* Piper. *E.u.* ssp. *s.* S.Stokes. *E. heracleoides* var. *s.* R.J. Davis.] Low prostrate mat-forming perennials up to 8 dm across; leaves lanate to densely tomentose below, thinly floccose to glabrous and olive-green above; stems up to 4 dm long; flowers cream, 3-6 mm long. ---Common in the mountains of n. Utah; sw. Can. s. to Ore., Ida., n. Utah. and central Colo. Jun-Sep.

VAR. SUBARIDUM S.Stokes. [*E. biumbellatum* Rydb. *E. ferrissii* A.Nels. *E.u.* ssp. *f.* S.Stokes. *E.u.* ssp. *s.* Munz.] Erect to subshrubby perennials up to 6 dm across and 1 m high; leaves thinly floccose to glabrous on both surfaces; stems 0.5-2 dm long; flowers bright yellow or rarely cream-colored, 6-7 mm long. ---Restricted to the s. half of the state; extreme sw. Colo., s. Utah and n. Ariz. w. across s. Nev. to se. Calif. Jul-Oct.

44. *E. HERACLEOIDES* Nutt. [*E. gyrophyllum* Nutt. *E.h.* var. *minus* Benth. in DC. *E.h.* var. *multiceps* Gand. *E.h.* var. *utahense* Gand. *E.h.* var. *nydbergii* Gand.] Low spreading freely branching herbaceous perennials forming mats up to 6 dm across; leaves linear-ob lanceolate to broadly oblanceolate, 2-5 cm long, 4-10 (15) mm wide, densely lanate to tomentose below, thinly floccose to glabrous above, the margin flat, the petiole 0.5-3 cm long; stems erect, slender to stoutish, 1-3 (4) dm long with a whorl of large foliar bracts about midlength, tomentose to floccose; inflorescences simple to compoundly umbellate, subcapitate in alpine forms, mostly open and up to 1 dm long and across, the rays tomentose to floccose; peduncles similar to the rays, up to 3 cm long, erect to slightly spreading, tomentose; involucre turbinate to campanulate, the tube 2-4.5 mm long, 2.5-5 (6) mm wide, tomentose, the reflexed lobes (2) 3-6 (7) mm long; flowers white to cream, 4-9 mm long including the 1.5-3 mm long stipe, glabrous, the tepals spatulate to oblong-ovate; achenes light to dark brown, (2) 3.5-5 mm long.--- Common in the foothills and mountains of n. Utah; sw. Can. s. to ne. Calif., e. across n. Nev. and Utah to nw. Colo., w. Wyo. and w. Mont. May-Aug.

In Utah, only the typical variety of the species is found. However, in the Pacific Northwest, two additional variants are found. One, the var. *angustifolium* (Nutt.) Torr. & Gray occurs from southern British Columbia southward through eastern Washington to north-eastern Oregon. A second variety, var. *leucophaeum* Reveal<sup>1</sup> has been known for some time under the name var. *minus*, but its type is merely a small plant of var. *heracleoides* and not worthy of a formal name. Douglas recognized this new variety as different from *E. heracleoides* and proposed the name used here at the species level on a specimen he collected in Oregon or Washington - "Very gravelly soils of the interior," as the specimen at Kew reads. It is felt now, that this entity can not be recognized as a distinct species, but should be maintained at the varietal level as its concept has (at least) since the 1850s.

45. *E. CAESPITOSUM* Nutt. [*E. andinum* Nutt. *E.c.* var. *alyssooides* Gand.] Low pulvinate to caespitose herbaceous perennials forming mats up to 4 dm across; leaves elliptic to obovate or oblong-spatulate to nearly oval, 2-10 (15) mm long, 1.5-4 (5) mm wide, tomentose on both surface to slightly less so to floccose above, the margin mostly flat, the petiole 0.5-4 mm long; stems scapose, + erect, (1) 3-8 (10) cm long, usually floccose to glabrous, without

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<sup>1</sup>*Eriogonum heracleoides* Nutt. var. *leucophaeum* Reveal, var. nov. A var. *heracleoides* caulibus sine bracteis differt. Leaves linear-ob lanceolate, 1.5-3 (3.5) cm long, 2-5 mm wide, lanate to tomentose below, floccose above; stems without a whorl of foliaceous bracts about midlength.---TYPUS: WASHINGTON: Spokane Co., Along U.S. Highway 10-395, 0.3 mile northeast of Tyler, 10 miles southwest of Cheney, 19 June 1966, Holmgren & Reveal 2730. Holotypus, US! Isotypi, ARIZ, ASU, BRY, CAS, GH, MO, NY, OSC, RM, RSA, UC, UTC, WTU!

bracts even at the base of the involucre; inflorescences capitate; involucre campanulate, the tube 2-3.5 mm long, 3-5 mm wide, tomentose to floccose, the 6-9 reflexed lobes 2-3.5 mm long; flowers yellow, becoming reddish with age, 2.5-10 mm long including the 0.5-1 mm long stipe, pilose to villous without, the tepals  $\pm$  oblong to oblanceolate; achenes light brown to brown, (3.5) 4-5 mm long, with a glabrous to slightly pubescent beak.---Infrequent on scattered desert ranges of w. Utah from Tooele Co. s. to Washington Co.; e. Calif. and Ore. e. to w. Mont., w. Wyo. and nw. Colo. Apr-Jun.

46. *E. JAMESII* Benth. in DC. Low matted to robust and erect herbaceous perennials up to 4.5 dm high and 6 dm across; leaves oblanceolate to elliptic, (0.5) 1-3 cm long, 0.5-1.5 cm wide, tomentose below, floccose above, the margin mostly entire and flat, the petiole 0.5-5 cm long; stems erect, slender to stoutish, (3) 5-25 cm long, tomentose to floccose; inflorescences usually open, simple or compoundly umbellate, rarely highly reduced and subcapitate to capitate, up to 2 dm long, tomentose to floccose; involucre turbinate to campanulate, 3-7 mm long, 2.5-8 mm wide, tomentose to floccose, the 5-8 erect teeth up to 0.5 mm long; flowers yellow, (4) 5-8 mm long including the 0.7-2 mm long stipe, densely pilose without, the tepals dimorphic, those of the outer whorl lanceolate to elliptic, those of the inner whorl narrower and longer; achenes light brown to brown, 4-5 mm long, with a sparsely pubescent beak.---Relatively common, but scattered, in sw. Utah and mostly in pinon-juniper woodlands of e. Utah; Utah, Colo. and s. Wyo. s. into Ariz., N.M., w. Kans., w. and n. Tex. and ne. Mex. Jun-Oct.

In Utah only two varieties of this species occur. The typical variant, var. *jamesii*, has white to cream flowers, with entire leaf margins, and ranges from Colorado southward into eastern Arizona, most of New Mexico and the northern and western parts of Texas. A couple of related populations occur elsewhere. The var. *simplex* Gand which may be distinguished by its highly reduced (mostly simple) inflorescence occurs in southwestern Kansas, isolated from the remaining varieties of the species. Var. *undulatum* (Benth. in DC.) Stokes ex Jones is the common Mexican phase which just enters the United States in Texas and southeastern Arizona. The new variety, var. *wootonii* Reveal<sup>2</sup> is similar to var. *flavescens*, but

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<sup>2</sup> *Eriogonum jamesii* Benth. in DC. var. *wootonii* Reveal, var. nov. A var. *flavescens* foliis late ellipticis, 3-5 cm longis, 1.5-3 cm latis, bracteis ellipticis, 2-4 cm longis, 0.7-1.8 cm latis differt. Mats up to 5 dm across; leaves broadly elliptic, 3-5 cm long, 1.5-3 cm wide, the margin entire; inflorescences divided 3-5 times, up to 2 dm long; bracts mostly narrowly elliptic, 2-4 cm long, 0.7-1.8 cm wide; involucre 3-6 mm long, 4-9 mm wide; flowers yellow, 4-7 (9) mm long.---TYPUS: NEW MEXICO: Lincoln Co., White Mountains, 7000 feet elevation, 11 Aug 1897, *Wooton 319*. Holotypus, US! Isotypi, G, GH, KSC, MO, ND-G, NMC, NY, P, UC, UMN!

differs in having consistently larger leaves and bracts, a more divided inflorescence, slightly larger flowers, and an isolated location, the new variety being restricted to the high mountains of Otero and Lincoln cos. The last variety, var. *rupicola*, is described below.

VAR. FLAVESCENS S. Wats. [*E. arcuatum* Greene. *E. bakeri* Greene. *E. vegetius* A.Nels. *E.j.* ssp. f. S.Stokes. *E.j.* ssp. b. S.Stokes. *E.j.* var. a. S.Stokes.] Mats up to 5 dm across; leaves mostly elliptic, 1-3 cm long, 0.5-1.5 cm wide, the margin entire; inflorescences divided 1-3 times, up to 2 dm long; bracts mostly narrowly elliptic, up to 2 cm long and 1 cm wide; involucre 3-7 mm long, 4-8 mm wide; flowers yellow, (4) 5-8 mm long.---In the mountains and foothills of e. Utah; se. Wyo., s. Colo. and n. N.M. w. into w. Colo. and n. Ariz. Jul-Oct.

VAR. RUPICOLA Reveal. Mats up to 6 dm across; leaves elliptic to broadly elliptic, 5-12 mm long, 5-8 mm wide, the margin entire or nearly so; inflorescences subcapitate (or rarely capitate) to umbellate, divided 1 time, up to 4 cm long; bracts narrowly elliptic, up to 10 mm long and 5 mm wide; involucre 3-5 mm long, 3-4 mm wide; flowers yellow, 4-5 mm long.---Rare on sandstone ledges and in adjacent reddish blow sand in Zion National Park, Washington and Kane cos. Endemic. Jul-Sep.

*Eriogonum jamesii* Benth. in DC. var. *rupicola* Reveal, var. nov. A var. *flavescens* foliis brevioribus, 5-12 mm longis, 5-8 mm latis, bracteis ad 10 mm longis et 5 mm latis, floribus 4-5 mm longis.---TYPUS: UTAH: Washington Co., Zion National Park, along Utah Highway 15, 4.9 miles west of the eastern entrance of the Park, on the Checkerboard Mesa at about 5200 feet elevation, 12 Aug 1972, Reveal & Reveal 2874. Holotypus, US! Isotypi, 19 duplicates to be distributed from US.

#### SUBGENUS PTEROGONUM (H. GROSS) REVEAL

47. *E. ALATUM* Torr. in Sitgr. [*E. triste* S.Wats. *E.a.* ssp. *t.* S.Stokes.] Tall erect monocarpic herbaceous perennials 5-15 dm high arising from a large chambered taproot; leaves linear-lanceolate to lanceolate or oblanceolate, 0.3-2 dm long, 0.3-1.5 cm wide, strigose above and below, becoming glabrous in most or only on the upper surface, the petiole 2-5 cm long, the cauline leaves narrower and shorter; stems erect, 3-10 dm long, strigose to nearly glabrous or even glabrous especially in fruit; inflorescences open paniculate cymes, 2-6 dm long, sparsely strigose to glabrous; peduncles erect, 0.5-3 cm long, sparsely strigose to glabrous; involucre turbinate to campanulate, 2-4 (4.5) mm long and wide, mostly strigose without, 5-lobed; flowers yellow to yellowish-green, 1.5-2.5 mm long in anthesis, 3-6 mm long in fruit and often turning reddish, glabrous, the tepals lanceolate; achenes yellowish- to greenish-brown, maturing reddish-brown, 5-9 mm long, 3-6 mm wide, glabrous, distinctly winged the entire length.---Rather common on sandy to sandy-loam soils in s. and e. Utah; e. Utah, Colo., se. Wyo.,

w. Neb. s. through w. Kans., w. Okl. and n. Tex., Ariz. and N.M. to w. Tex. and extreme n. Mex. Jun-Oct.

SUBGENUS GANYSMA (S. WATS.) GREENE

48. *E. INFLATUM* Torr. & Gray. Erect annuals or first-year flowering perennials 1-10 dm high; leaves oblong-ovate to oblong or rounded to reniform, (0.5) 1-2.5 (3) cm long, (0.5) 1-2 (2.5) cm wide, short-hirsute on both surfaces, infrequently less so to villous or glabrate above, the margin entire or crisped-undulate, the petiole 2-6 cm long; stems usually fistulose or inflated, usually glabrous or merely pubescent at the base, (0.2) 1-4 dm long; inflorescences cymose, open, 0.5-5 dm long, 0.5-8 dm wide, the branches occasionally inflated, glabrous, with 3-5 branches at the first node; peduncles filiform to capillary, erect, 5-20 mm long, glabrous; involucre turbinate, 1-1.5 mm long, 1-1.8 mm wide, glabrous or with the lobes slightly glandular in some, 5-lobed; flowers yellow with reddish or greenish midribs and bases, (1) 2-2.5 (3) mm long, short-hirsute, the tepals lance-ovoid to ovoid; achenes light brown to brown, 2-2.5 mm long.---On clay hills and flats in s. and e. Utah; e. Calif., Nev., Utah, and w. Colo. s. to Mex. Mar-Oct.

VAR. *INFLATUM*. First-year flowering perennial (1) 2-10 dm high; stems fistulose, grayish.---Rather common across s. Utah and n. in e. Utah as far as s. Uintah Co. Mar-Oct.

VAR. *FUSIFORME* (Small) Reveal. [*E. f. Small.*] Strictly annual plants 1-3 dm high; stems strongly inflated, greenish.---Locally common to abundant on clay hills and flats in ne. Utah in Uintah and Duchesne cos. s. to Grand Co.; w. Colo. Mar-Jul.

49. *E. TRICHOPES* Torr. [*E. trichopodum* Torr. ex Benth. in DC. *E. trichopodum* var. *minus* Benth. in DC. *E.t.* ssp. *m.* S.Stokes.] Erect annuals 1-4.5 dm high; leaves basal, round-oblong to rounded, 1-2.5 (4) cm long, 1-2 (3) cm wide, hirsute, the margin entire or crenulate, the petiole 1-6 cm long; stems erect, usually slender, rarely slightly fistulose, glabrous or only minute pubescent at the base, 0.5-1.5 dm long; inflorescences densely paniculated cymes, 0.5-4 dm long and wide, the branches slender, glabrous, with numerous secondary branchlets at the lower nodes; peduncles capillary,  $\pm$  erect, 5-15 mm long, glabrous; involucre turbinate, 0.7-1 mm long, 0.6-0.9 mm wide, glabrous, 4-lobed; flowers yellowish to greenish-yellow, 1-2 (2.5) mm long, short-hirsute, the tepals lance-ovate; achenes light brown to brown, 1.5-2 mm long.---Clay hills and flats in Washington Co.; sw. Utah, s. Nev. and se. Calif. s. to n. Mex. and e. across most of Ariz. to s. N.M. Mar-Sep.

The distinction between *Eriogonum inflatum* and *E. trichopes* is often difficult to make. The immature, first-year flowering specimens of the first are often similar to those of the second. However, as the plants age, their differences become readily obvious and separation is possible.

50. *E. HOWELLIANUM* Reveal. Low erect or spreading herbaceous annuals 0.5-3 dm high; leaves basal, broadly elliptic to oval, 7-25 mm long, 5-20 mm wide, pilose-hirsutulous, the petiole 5-40 mm long; stems erect, slender, 3-10 cm long, glandular; inflorescences open and rounded, 0.5-2 dm long, 0.5-1.5 (2) dm wide, evenly scattered glandular throughout; peduncles slender, straight or curved, ascending to erect, 3-10 mm long, becoming slightly shorter above, sparsely glandular along the lower half of its length; involucre turbinate-campanulate, 1.3-2 mm long, 1-2 mm wide, glabrous, 5 (rarely 4) toothed; flowers yellow with reddish midribs, 1-1.5 (2) mm long, densely pilose, the tepals lanceolate; achenes brown, 1.5-1.8 mm long.---Rare and local on dry sandy to gravelly soil in low foothills of the desert ranges in w. Utah from Tooele Co. s. to Millard Co.; e. Nev. from Elko Co. s. to Lincoln and se. Nye cos. Jun-Sep.

*Eriogonum howellianum* Reveal, *sp. nov.* Herba annua, 0.5-3 dm alta; folia basi, laminis  $\pm$  ellipticis vel ovalis, 7-25 mm longis, 5-20 mm latis, pilosi-hirsutulosi, petiolis 5-40 mm longis; caules erecti, 3-10 cm longi, glandulosi; inflorescentiae 0.5-2 dm longae, 0.5-1.5 (2) dm latae, glandulosae; pedunculi  $\pm$  erecti, 3-10 mm longi, sparse glandulosi; involucria turbinato-campanulata, 1.3-2 mm longa, 1-2 mm lata, glabra, 5-lobata (raro 4-lobata); flores lutei, 1-1.5 (2) mm longi, pilosi, tepalis lanceolatis; achaenia infuscata, 1.5-1.8 mm longa.---TYPUS: UTAH: Millard Co., Along Utah Highway 21, 17 miles southeast of Garrison, on low limestone hills near the road, associated with *Artemisia Atriplex Oryzopsis*, at about 6200 feet elevation, 23 Jul 1965, Holmgren, Reveal & LaFrance 2248. Holotypus, US! Isotypi, ARIZ, BRY, CAS, DS, GH, KSC, MO, NY, OKL, OSC, RM, RSA, TEX, UC, UTC, WTU!

*Eriogonum howellianum* has been known since the 1890s but only as *E. glandulosum* (Nutt.) Nutt. ex Benth. in DC. In 1956, Howell published a paper on *E. glandulosum* and his concept followed that of other, earlier floristic workers in attributing this species to the plants found in eastern Nevada and western Utah. In 1969, his comments were followed in my own treatment of the genus where I suggested the type of *E. glandulosum* may have come from western Utah (a point later repeated in 1972 in the first volume of the *Intermountain Flora*). In Howell's 1956 paper, he proposed a var. *carneum*, then a poorly known taxon from the desert ranges of eastern California. By 1968, J.C. Beatley had rediscovered the variant and provided me with numerous specimens which showed this entity to be a distinct species, and such was then proposed (Reveal & Munz, 1968).

In the winter of 1972, I visited the Royal Botanic Gardens at Kew, and reviewed the type (actually an isotype) of *Eriogonum glandulosum*. Much to my surprise, the type proved to be what I had been calling *E. carneum*, and not what was then thought of as *E. glandulosum*. As a result of this discovery, a new species name was needed for the element long known as *E. glandulosum*, and *E. howellianum* is here proposed to honor John Thomas Howell of the California Academy of Sciences who first reviewed the species.

51. *E. FLEXUM* M.E. Jones. [*E.g.* var. *ferronis* M.E. Jones.] Erect herbaceous annuals (0.5) 1-3 dm high; leaves basal, orbicular to orbicular-rhombic, 0.5-2 cm long and wide, sparsely and minutely strigose when young on both surfaces, becoming glabrous with age, infrequently sparsely glandular on both surfaces in some, the petiole 1-4 cm long; stems erect, 3-7 cm long, minutely glandular; inflorescences erect or spreading, 0.5-2.5 dm long, glabrous except for scattered glands at the lower nodes; peduncles filiform, 1-3 cm long, flexed to an acute angle about 3/4 of the distance, glandular up to about the middle, otherwise glabrous; involucre broadly campanulate, composed of two whorls of 3 foliaceous lobes, these lanceolate, divided nearly to the base of the tube, those of the outer whorl wider and shorter than those of the inner whorl; flowers yellow, 1.5-2.5 mm long in anthesis, becoming 2.5-4 mm long in fruit, pilose without, the tepals lanceolate; achenes light brown, 2-2.5 mm long.---Dry clay hills and flats of e. Utah from Uintah Co. s. to Kane and San Juan cos.; e. to w. Colo. and s. to nw. N.M. and ne. Ariz. Apr-Jul.

52. *E. SALSUGINOSUM* (Nutt.) Hook. [*Stenogonum s.* Nutt.] Low spreading suberect herbaceous annuals 0.5-1 dm high and 0.5-4 dm across; leaves basal and cauline, the basal ones spatulate, (1) 2-4 cm long, (0.5) 1-2.5 cm wide, glabrous, the petiole 0.5-2 cm long, the cauline ones linear-lanceolate to oblanceolate, 0.5-4.5 cm long and 2-10 mm wide, glabrous, sessile; stems prostrate to suberect, 1-3 cm long, glabrous; inflorescences open, 0.5-2 dm long, glabrous; peduncles, when present, slender to filiform, up to 4 cm long, erect and straight, glabrous; involucre broadly campanulate, composed of two whorls of 3 foliaceous lobes, these lanceolate, divided nearly to the base of the tube, those of the outer whorl longer and narrower than those of the inner whorl; flowers yellow, 1.5-2.5 mm long in anthesis, becoming 2.5-3 mm long in fruit, pilose without, the tepals lanceolate; achenes light brown, 2-2.5 mm long.---Locally common on dry clay hills and flats in scattered locations in e. Utah from Uintah Co. s. to San Juan Co.; sw. Wyo. s. through extreme w. Colo. to nw. N.M., n. Ariz. and in Lincoln Co., Nev. Apr-Sep.

53. *E. GORDONII* Benth. in DC. [*E. trinervatum* Small.] Erect herbaceous annuals 1-4 (6) dm high; leaves basal, obovate to round or reniform, 1-5 cm long and wide, sparsely villous to hirsute on both surfaces, often becoming glabrous, the petiole 1-5 cm long; stems erect, 5-15 cm long, sparsely hispid at the base in some, otherwise glabrous, rarely sparsely glandular; inflorescences open to dense, 5-30 cm long, sparsely hispid or more commonly glabrous; peduncles slender, erect, 0.5-2 cm long, glabrous, rarely slightly hirsute or hispid near the base; involucre campanulate, 0.6-1.3 mm long, 0.8-1.5 mm wide, glabrous, the 5 teeth 0.2-0.4 mm long; flowers white with greenish- to reddish-brown midribs and bases, becoming pinkish to rose in fruit in some, 1-2.5 mm long, glabrous, the tepals oblong-ovate to oblong; achenes light brown to brown,

2-2.5 mm long, glabrous.---Mostly on clay hills and flats in e. and s. Utah; w. Neb. and s. Wyo. s. across e. Utah and w. Colo. to nw. N.M. and n.e. Ariz. Jun-Sep.

54. *E. DEFLEXUM* Torr. in Ives. Erect to spreading herbaceous annuals (0.5) 1-5 dm high; leaves basal, cordate to reniform or nearly orbicular, 1-2.5 (4) cm long, 2-4 (5) cm wide, white-tomentose below, floccose to subglabrous above, the petiole 1-7 cm long; stems slender, 3-20 cm long, glabrous; inflorescences erect or spreading, open to diffuse, 1-4.5 dm long, glabrous; peduncles usually lacking, or if present, up to 5 mm long, glabrous, strongly deflexed; involucre turbate, 1.5-2 mm long, 1-1.5 mm wide, glabrous, the 5 acute teeth 0.2-0.5 mm long; flowers white with greenish to reddish midribs and bases, 1-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl ovate to oblong, the base usually subcordate to  $\pm$  obtuse, those of the inner whorl lanceolate to narrowly ovate; achenes brown to dark brown, 1.5-2 (2.5) mm long.---In scattered locations in w. and s. Utah; e. and s. Calif. e. across Nev. to w. Utah, s. in s. Utah to nw. Mex. May-Oct.

VAR. *DEFLEXUM*. [*E.d. f. stenopetale* H.Gross.] Plants mostly 1-5 dm high; peduncles, when present, up to 5 mm long; involucre turbate, mostly 2 mm long; flowers 2 mm long, the outer whorl of tepals mostly ovate with subcordate bases.---Mostly in s. Utah from Washington Co. e. to San Juan and Garfield cos., and in scattered places elsewhere in w. Utah; nw. Mex. n. to s. Calif., s. Nev. and s. Utah. May-Oct.

The typical phase of the species is that element which occurs mainly in the warm deserts of the Southwestern United States. It is found on varied sites (i.e., gypsum, volcanics, and sandstones) in this area, but gradually gives rise to var. *nevadense*, the typical phase of the Great Basin, along a broad line from Nye Co., Nevada to western Utah. The var. *nevadense* differs mainly in its flower construction, the tepals being narrower with  $\pm$  obtuse bases and more oblong margins.

VAR. *NEVADENSE* Reveal. Plants mostly 0.5-3 dm high; peduncles lacking; involucre turbate, mostly 1.5 mm long; flowers mostly 1.5 mm long, the outer whorl of tepals mostly oblong with subcordate to obtusish bases.---Mostly in w. Utah in the Great Basin from Millard Co. s. to n. Washington Co.; w. Nev. to w. Utah. Jun-Aug.

*Eriogonum deflexum* Torr. in Ives var. *nevadense* Reveal, var. nov. A var. *deflexo* floribus 1.5 mm longis, tepalis oblongis, involucri 1.5 mm longis, pedunculis nullis.---TYPUS: NEVADA: Nye Co., near Lunar Crater, 4.2 miles south of U.S. Highway 6, on gravelly volcanic soil associated with *Ceratoides* at 5850 feet elevation, 18 Jul 1972, Reveal & Reveal 2785. Holotypus, US! Isotypi, to be distributed from US!

This phase of the species was discussed by me (Reveal, 1968a) under the name "Nevadan phase." It is restricted to the Great Basin portion of the Intermountain Region, and in Utah is found in the deserts of the western counties.

55. *E. HOOKERI* S.Wats. [*E. deflexum* ssp. *h.* S.Stokes. *E.d.* var. *gilvum* S.Stokes.] Erect herbaceous annuals 1-6 dm high; leaves basal, cordate to subreniform, (1) 2-5 cm long, 2-6 cm wide, tomentose on both surfaces or slightly less so above but still tomentose, the petiole 1-5 cm long; stems slender to stout, 0.5-3 cm long, glabrous; inflorescences spreading, subglobose to + flat-topped, up to 5 dm across, glabrous; peduncles lacking; involucre broadly campanulate to hemispheric, 1-2 mm long, 1.5-3 (3.5) mm wide, deflexed, glabrous, the 5 acute teeth 0.6-1.2 mm long; flowers yellow, becoming reddish-yellow in fruit, 1.5-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl of tepals orbicular or hastate, those of the inner whorl oblong; achenes light brown, 2-2.5 mm long.---Infrequent, but often locally common, in scattered locations throughout most of Utah, but particularly common in n. Utah; e. Calif. e. across Nev. to sw. Wyo. and w. Colo., s. to n. Ariz. Jul-Oct.

56. *E. BRACHYPODUM* Torr. & Gray. [*E. parryi* A.Gray. *E. deflexum* var. *b.* Munz. *E.d.* ssp. *b.* S.Stokes. *E.d.* ssp. *p.* S.Stokes.] Low spreading to erect herbaceous annuals 0.5-3 (4) dm high; leaves basal, orbicular to cordate, 1-3 (4) cm long, (1.5) 2-4 (5) cm wide, densely tomentose below, tomentose to subglabrous and green above, the petiole 1-4 cm long; stems slender to stout, 2-7 cm long, glandular; inflorescences horizontal in low, flat-topped crowns, or spreading and forming more open, subglobose crowns, the branches glandular; peduncles slender to stoutish, up to 15 mm long, deflexed, glandular; involucre turbinate to campanulate, 1-2.5 mm long, 1.5-2.5 mm wide, glandular, the 5 acute teeth 0.4-1 mm long; flowers white to reddish, 1-2.5 mm long, glabrous, the tepals dimorphic, those of the outer whorl ovate to oblong with cordate to auriculate bases, those of the inner whorl oblanceolate; achenes brown to blackish-brown, 1.5-2 mm long.---Restricted in Utah to Washington Co.; w. Nev. and e. Calif. e. across s. Nev. to sw. Utah and nw. Ariz. Mar-Oct.

57. *E. INSIGNE* S.Wats. [*E. exaltatum* M.E. Jones. *E.d.* var. *i.* M.E. Jones. *E.d.* ssp. *i.* S.Stokes. *E.d.* ssp. *e.* S.Stokes.] Tall erect herbaceous annuals (0.5) 3-10 dm high; leaves basal, subcordate to orbicular, (1.5) 2-5 (8) cm long and wide, tomentose below, floccose to subglabrous and greenish above, the petiole 1-10 cm long; stems stout, (0.2) 2-20 cm long, glabrous; inflorescences narrow, strict, (0.5) 1-8 dm long, glabrous, the branches long and whip-like with racemously arranged involucre at the tips; peduncles erect, 0-2 mm long, glabrous; involucre turbinate, 2-2.5 (3) mm long, 1.5-2.5 mm wide, glabrous, the 5 acute teeth 0.5-1 mm long; flowers white with greenish to reddish midribs and bases, 1.5-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl oblong with cordate bases, those of the inner whorl oblanceolate; achenes dark brown to blackish, 2-2.5 mm long.---Rare, sandy soil in Washington Co. and perhaps to be found in Iron Co.; s. Calif. e. across s. Nev. to nw. Ariz. and sw. Utah. May-Oct.

58. *E. SCABRELLUM* Reveal. Erect and spreading herbaceous annuals 1-5 dm high; leaves basal, cordate, 1-3 cm long and wide, densely tomentose below, floccose above, the margin crisped and wavy, the petiole 1-4 cm long; stems slender, 5-15 cm long, sparsely to rather densely tomentose, scabrellous throughout; inflorescences  $\pm$  flat-topped, 0.5-4 dm high and across, the branches lightly to sparsely floccose, becoming less obvious with age, scabrellous throughout; peduncles lacking; involucre turbinate, 1.5-2.5 mm long, 1.5-2 mm wide, horizontally arranged on the branches, becoming somewhat deflexed with age, arising from the bracts along the edge of the branch, the tube scabrellous, the 5 acute teeth 0.3-0.8 mm long; flowers white to pink or rose to red, 1-1.5 mm long, pustulose, the tepals dimorphic, those of the outer whorl obovate with obtuse bases, those of the inner whorl ovate; achenes light brown, 2 mm long.---Rare and locally common, on clay hills and flats in e. Utah from Grand Co. s. to San Juan and Kane cos.; w. Colo. Jul-Oct.

59. *E. CERNUUM* Nutt. Low to high, spreading to erect herbaceous annuals 0.5-6 dm high; leaves basal or sheathing up the stems, ovate to orbicular, (0.5) 1-2 (2.5) cm long and wide, densely tomentose below, tomentose to floccose or subglabrous and greenish above, the petiole 1-4 cm long; stems slender, 0.3-2 dm long, glabrous; inflorescences open, erect or spreading, 0.5-5 dm high and up to 4 dm across, the branches glabrous and often glaucous; peduncles lacking or present, slender, cernuous, spreading or ascending, 1-25 mm long, glabrous; involucre turbinate, (1) 1.5-2 mm long, 1-1.5 mm wide, glabrous, the 5 acute teeth 0.2-0.7 mm long; flowers white to pinkish with greenish to reddish midribs and bases, 1-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl panduriform with crisped or slightly wavy margins, those of the inner whorl obovate; achenes light brown to brown, 1.5-2 mm long.---Common throughout much of Utah; w. Can. s. to Calif., Ariz., and N.M. Jun-Oct.

VAR. *CERNUUM*. [*E.c.* var. *tenue* Torr. & Gray. *E.c.* var. *umbraticum* Eastw. *E.c.* ssp. *t.* S.Stokes.] Involucres with peduncles 1-25 mm long throughout.---Common in various habitats throughout much of Utah; range of the species. Jun-Oct.

VAR. *VIMINALE* (S.Stokes) Reveal in Munz. [*E.c.* ssp. *v.* S.Stokes.] Involucres sessile on the branches throughout.---Infrequent on desert valley floors and foothills of w. Utah; ne. Calif. and se. Ore. e. across Nev. to w. Utah. Jul-Sep.

This particular species can be confused with *Eriogonum deflexum* if the nature of the flowers is not carefully checked. While the overall habit of the two plants is strikingly different, without prior knowledge, one will often key var. *nevadense* to *E. cernuum*. If in doubt, check to see if the involucre is peduncled (if so, then likely var. *cernuum*!) or if the flowers have crisped or wavy margins - a feature of *E. cernuum* only. The stems of *E. deflexum* are usually greenish, whereas, those of *E. cernuum* are usually gray.

60. *E. NUTANS* Torr. & Gray. [*E. cernuum* var. *purpurascens* Torr. & Gray. *E. rubiflorum* M.E. Jones. *E. deflexum* ssp. *ultrum* S.Stokes.] Erect to spreading herbaceous annuals 5-30 cm high; leaves basal, round to broadly reniform, 5-25 mm long and wide, densely white tomentose below, floccose to subglabrous and greenish-brown above, the petiole 5-25 mm long; stems slender, 3-15 cm long, glandular and often reddish; inflorescences open to diffuse, spreading, 5-20 cm long, up to 3 dm across, glandular throughout; peduncles slender, curving downward, 3-10 mm long, glandular; involucre campanulate, 2-3 mm long, 2-3.5 mm wide, glandular, the 5 acute teeth 0.3-0.9 mm long; flowers white to rose or red, with a reddish to reddish-brown midrib and base, 2-3 mm long, essentially glabrous without, the tepals dimorphic, those of the outer whorl oblong to oval with emarginated apices, those of the inner whorl oblanceolate; achenes brown, 1.7-2 mm long.---Rare and infrequent in scattered locations in n. Utah, from Tooele Co. s. to Sevier Co. and e. to Carbon Co., on sandy to loam soils; w. Nev. and se. Ore. e. to Utah. May-Sep.

This species is rare in most of its known locations, often known from but a single plant! Infrequently, a local population may be composed of several individuals, but even then the plants are usually scattered and only rarely is this plant weedy like other members of this group of annuals. A distinct variety, var. *glabratum* Reveal is found in Elko Co., Nevada. It differs from the typical phase in being glabrous throughout - to date it is not known to be in our area.

61. *E. THOMASII* Torr. [*E. minutiflorum* S.Wats.] Low spreading herbaceous annuals 0.5-3 dm high; leaves basal, round to round-reniform, 5-20 mm long and wide, densely tomentose below, floccose to glabrate above, the petiole 5-30 mm long; stems slender, 2-10 cm long, glabrous except for a few scattered glands near the base in some; inflorescences spreading, open to diffuse, 0.5-2.5 dm long and across, glabrous; peduncles spreading, capillare, 5-20 mm long, glabrous; involucre turbinate-campanulate, 0.6-1.2 mm long, 0.7-1.3 mm wide, glabrous, the 5 acute teeth 0.2-0.4 mm long; flowers yellow and 0.8-1 mm long at anthesis, becoming white to rose and 1.2-2 mm long in fruit, short-hispidulous without, the tepals dimorphic, those of the outer whorl plane in early anthesis but soon becoming saccate-dilated on each side of the cordate base, the inflated area often white to pink, those of the inner whorl spatulate and often as long to slightly longer than the outer whorl; achenes brown to dark brown, 0.8-1 mm long.---Infrequent in sandy soil in Washington Co.; se. Calif. and Baja Calif. e. to w. Ariz. and sw. Utah. Mar-Jun.

62. *E. PUSILLUM* Torr. & Gray. [*E. reniforme* ssp. *p.* S.Stokes.] Spreading herbaceous annuals 0.5-3 dm high; leaves basal, oblong-ovate to rounded, 0.5-2 (3) cm long, 0.4-2 (2.5) cm wide, densely tomentose below, floccose to subglabrous and greenish-yellow above, the hairs infrequently glandular, the petiole 1-3 cm long; stems slender, 1-8 cm long, glabrous except for scattered glands at the

base in some; inflorescences open, spreading, 0.5-2.5 dm long and across, glabrous; peduncles slender, 1-3.5 (4) cm long, spreading to ascending, glabrous; involucre broadly turbinate to campanulate, 1-1.5 (1.7) mm long, 1.5-3 mm wide, glandular without, the 5 acute to rounded teeth 0.4-0.7 mm long; flowers yellow and 1-1.7 mm long in anthesis, becoming reddish-yellow and 2-2.5 mm long in fruit, glandular without, the tepals dimorphic, those of the outer whorl oblong-elliptic to obovate, those of the inner whorl oblong; achenes dark brown, 0.6-0.8 mm long.---Infrequent, on sandy soils in Washington Co.; s. Calif. n. to se. Ore. and sw. Ida., e. across s. Nev. to sw. Utah and w. Ariz. Mar-Jul.

This species is closely related to *E. reniforme* Torr. & Frém. which approaches southwestern Utah in Clark Co., Nevada. It differs from *E. pusillum* in having glabrous involucre.

63. *E. WETHERILLII* Eastw. [*E. sessile* Stokes ex Jones. *E. filiforme* L.O. Will.] Low spreading herbaceous annuals 0.5-2.5 dm high; leaves basal, oblong to orbicular, (0.5) 1-4 cm long, (0.5) 1-3 cm wide, densely tomentose below, floccose to subglabrous above, the petiole 1-5 cm long; stems slender, 1-5 cm long, glabrous except for villous bases in most; inflorescences compact and densely branched, 0.5-2 dm high, up to 4 dm across, the numerous branches becoming dark red with age, glabrous; peduncles filiform, erect, (3) 5-10 mm long, becoming shorter or lacking above in some, glabrous; involucre turbinate, (0.3) 0.5-1 mm long and wide, the 4 acute teeth up to 0.4 mm long; flowers yellow to red, 0.6-1.2 mm long in anthesis, becoming pinkish to rose or red and 1-1.5 mm long in fruit, glabrous, the tepals elliptic to obovate; achenes brown to black, 0.6-1 mm long.---Common in deep sandy soil in se. Utah from Grand and Emery cos. s. to Kane and San Juan cos.; w. Colo., nw. N.M. and n. Ariz. Apr-Sep.

64. *E. SUBRENIFORME* S.Wats. [*E. filicaule* S.Stokes.] Tall to slight spreading, erect herbaceous annuals 0.5-4 (6) dm high; leaves basal, orbicular to reniform, (0.5) 1-3.5 cm long, (0.5) 1-4 cm wide, tomentose below, hirsute to floccose or glabrous above, the petiole (1) 2-6 cm long; stems slender to stoutish, 2-15 (20) cm long, glabrous except for the hispid bases; inflorescences open to + diffuse, 0.5-4 dm long, up to 5 dm across, glabrous; peduncles filiform, 0.5-2.5 cm long, glabrous; involucre turbinate, 0.5-1 mm long, 0.6-0.9 mm wide, glabrous, the 5 acute teeth 0.2-0.4 mm long; flowers white to rose, 0.8-2 mm long, glabrous or sparsely hirsute without, the tepals lanceolate to spatulate or elliptic to ovate; achenes light brown, 1.7-2 mm long.---Infrequent and locally common on clay hills and slopes in s. Utah, from Washington Co. e. to San Juan Co. and n. to Garfield Co.; n. Ariz. and nw. N.M. Apr-Aug.

A related species, *Eriogonum viscidulum* J.T. Howell, known only from sandy hills near Bunkerville, Clark Co., Nevada, may be eventually found in Utah. It has viscid stems and branches and yellow

flowers 1.3-2 mm long. This annual may be expected to occur in the Virgin Narrows area of Washington Co.

65. *E. PHARNACEOIDES* Torr. in Sitgr. Erect herbaceous annuals 1-2 dm high; leaves basal and cauline, the basal ones linear-lanceolate to linear-ob lanceolate, 1-3 (4) cm long, 1-2.5 (4) mm wide, lanate below, villous and greenish above, the petiole 1-5 mm long, the cauline ones linear, 0.5-2 cm long, 0.5-2 mm wide, tomentose below, thinly villous to glabrous above, sessile; stems erect, villous, leafy; inflorescences open, 0.5-1.5 dm long and wide, the branches villous throughout; peduncles slender, erect or nearly so, (1) 2-5 cm long, villous to glabrous; involucre campanulate, the tube 1-2 mm long with 5 + erect, lanceolate lobes 1-3 mm long, villous; flowers yellow, 1-3 mm long, glabrous, the tepals dimorphic, those of the outer whorl oblong-ovate with a large saccate base on each side of the truncate to cordate base, those of the inner whorl linear-oblong; achenes brown, 1.8-2 mm long.---Rare, restricted to scattered desert ranges in w. Utah, known from Millard and Beaver cos.; Ariz. and sw. N.M., and in Lincoln Co., Nev. Aug-Oct.

The element discussed here is not representative of typical *Eriogonum pharnaceoides*, but represents an undescribed new variety. To date, however, this taxon is known only from a small number of specimens, all collected more than thirty years ago, and the total number of sheets is less than five. In August of 1972, I attempted to rediscover this plant in the Deer Lodge area of eastern Lincoln Co., Nevada. Unfortunately, since the early 1930s when the specimens in this area were made, the country roads have been badly eroded and essentially gone. While it was impossible to work a four-wheel drive truck into the area, I walked into the general region where Deer Lodge once existed, but could not find the annual. Attempts will be made to rediscover the plant in western Utah, hopefully in the fall of 1973, and enough material obtained to make a good type collection. The new variety differs from the typical phase of the species in having small yellow flowers, and is rather isolated from it. Other details will have to be determined with newer material.

66. *E. MACULATUM* Heller. [*E. angulosum* var. *m.* Jeps. *E.a.* ssp. *m.* S.Stokes.] Low spreading herbaceous annuals 1-2 (3) dm high; leaves basal and cauline, the basal ones lanceolate to obovate, 1-3 (4) cm long, 1-1.5 (2) cm wide, tomentose below, floccose to glabrate above, the margin entire or crisped and slightly revolute in some, the petiole 0.5-1 cm long, the cauline ones lanceolate to ob lanceolate, 0.5-2 cm long, 3-10 mm wide, similar to the basal leaves, sessile; stems slender, 2-8 cm long, mostly smooth or faintly angled in some, tomentose to floccose; inflorescences mostly open, spreading, 0.4-2.5 dm high and up to 3 dm across, tomentose to floccose; peduncles filiform, spreading, (5) 10-30 mm long, often glandular-puberulent or glabrous; involucre campanulate, 1-1.5 (2) mm long, 1.5-3 (3.5) mm wide, glandular-puberulent without, the 5 acute to rounded teeth 0.2-0.5 mm long; flowers white to yellow or pink to red with a large conspicuous rose to purple midrib, 1-2.5 mm long,

glandular-puberulent without, the tepals dimorphic, those of the outer whorl elliptic to roundish or obovate with an inflated area at the base and the middle with the sides incurved below, those of the inner whorl lanceolate to obtuse and extending beyond the apex of the outer whorl of tepals; achenes light brown, 1-1.5 mm long.

---Rather common in scattered locations on the w. deserts of w. Utah; s. and e. Calif. n. to s. Wash., e. into Ida., w. Utah and w. Ariz. Apr-Nov.

#### SUBGENUS OREGONIUM (S. WATS.) GREENE

67. *E. DAVIDSONII* Greene. [*E. baileyi* var. d. M.E. Jones. *E. juncinellum* Gand. *E. molestum* var. d. Jeps. *E. vimineum* ssp. f. S. Stokes. *E.v.* var. d. S.Stokes.] Rather tall, erect herbaceous annuals 1-2 dm high; leaves basal, mostly round to reniform, 1-2 cm long and wide, densely white-tomentose below, floccose to glabrate above, the petiole 1-3 cm long; stems erect, slender, 0.5-1 dm long, glabrous; inflorescences rather strict, erect, 0.5-1.5 dm long, up to 1 dm wide, glabrous; involucre cylindric-turbinate, (2.5) 3-4 (5) mm long, 1-2 mm wide, glabrous, the 5 acute teeth 0.2-0.4 mm long; flowers white to pink, 1.5-2 mm long, glabrous, the tepals oblong-obovate to oblong, the inner whorl of tepals slightly narrower than those of the outer whorl; achenes brown, 2 mm long.---Rare on sandy soil in s. Utah, Washington and Kane cos.; n. Ariz. and sw. Utah w. to n. Baja Calif. and s. Calif. Jun-Sep.

In Utah, this plant has been variously called *Eriogonum vimineum* or *E. juncinellum*. Only recently, however, has the name *E. davidsonii* been applied to the Utah plants (Reveal & Munz, 1968). In 1968, I placed *E. molestum* under *E. nudum* var. *pauciflorum* as a synonym, but field work in southern California in the summer of 1972 has shown this to be an error. *Eriogonum molestum* is a good species and an annual, closely related to *E. davidsonii*, but as the two occur together with no signs of intergradation, I am proposing they remain distinct species.

68. *E. NIDULARIUM* Cov. [*E. vimineum* ssp. n. S.Stokes.] Low to weakly erect herbaceous annuals (0.5) 1-3 dm high; leaves basal, rounded or nearly so, 0.5-2 cm long and wide, tomentose below, tomentose to floccose or rarely glabrate above, the petiole 1-3 cm long; stems spreading, 3-8 cm long, floccose; inflorescences dense, forming compact masses of numerous floccose branches 3-28 cm long, the tips of the branches often curving inwardly; involucre turbinate, 1 mm long, 0.5-0.7 mm wide, floccose, scattered along the branches and closely appressed to the stem, the 5 acute teeth 0.2-0.4 mm long; flowers yellow to reddish-yellow, 1.5-2 (3) mm long, glabrous, the tepals dimorphic, those of the outer whorl broadly fan-shaped, those of the inner whorl narrower and remaining erect; achenes brown, 1 mm long.---Locally common but in scattered locations in the deserts of w. Utah; s. Calif. e. across s. Nev. to w. Utah and Ariz., n. in e. Calif. and w. Nev. to se. Ore. and sw. Ida. Apr-Oct.

69. *E. PALMERIANUM* Reveal in Munz. [*E. plumatella* var. *palmeri* Torr. & Gray. *E. baileyi* var. *tomentosum* S.Wats.] Low spreading herbaceous annuals 1-3 dm high; leaves basal, suborbicular to cordate, 0.5-1.5 cm long, 0.5-2 cm wide, densely tomentose below, less so to glabrate above, the petiole 1-4 cm long; stems spreading, 3-8 cm long, floccose to tomentose; inflorescences open, forming loose spreading masses of few floccose to tomentose branches, 0.5-2.5 dm long, up to 3 dm across; involucre campanulate, 1.5-2 mm long, floccose to tomentose, only a few scattered along the branches and closely appressed to the stem, the 5 acute teeth 0.4-0.7 mm long; flowers white to pink, 1.5-2 mm long, glabrous, the tepals slightly dimorphic, those of the outer whorl of tepals narrowly fan-shaped, those of the inner whorl slightly narrower and erect; achenes brown, 1.5-1.8 mm long.---Locally common in scattered locations in w. and s. Utah mainly in the desert regions or in pinyon-juniper woodlands; sw. Colo. and extreme w. N.M. w. across Ariz. and s. Nev. to s. and e. Calif. Jun-Oct.

70. *E. POLYCLADON* Benth. in DC. [*E. vimineum* ssp. p. S.Stokes.] Erect herbaceous annuals 1-6 dm high; leaves cauline, narrowly oblanceolate to broadly elliptic, 1-3 cm long, 0.5-2 cm wide, densely tomentose below, only slightly less so above, the petiole 3-15 mm long; stems erect, slender, 1-3 dm long, tomentose; inflorescences narrow, strict, 1-5 dm long, the erect branches tomentose; involucre turbinate, 1.5-2.5 mm long, 1-1.5 mm wide, tomentose or rarely glabrous without, scattered along the upper branches and appressed to the stem, the 5 acute teeth 0.2-0.5 mm long; flowers white to pink, 1.5-2 mm long, glabrous, the tepals dimorphic, those of the outer whorl broadly fan-shaped and becoming strongly reflexed outwardly, those of the inner whorl narrower and remaining erect; achenes dark brown, 1-1.3 mm long.---Rare, but often locally abundant, on sandy soil in Washington and Kane cos.; Ariz. and N. M. s. through w. Tex. to Mex. Jul-Oct.

This southern species just enters Utah and is currently known from only three sites in the southern part of the state.

71. *E. DIVARICATUM* Hook. Low spreading herbaceous annuals 1-2 (3) dm high; leaves basal and cauline, the basal ones elliptic-oblong to orbicular, 1-3 cm long, 1-2 cm wide, puberulent to short pilose on both surfaces, the petiole 2-4 cm long, the cauline ones similar but becoming gradually reduced in size above; stems spreading to prostrate or decumbent, 3-5 cm long, puberulent, leafy; inflorescences spreading, 0.5-2.5 dm long, puberulent; involucre turbinate, 1-2 mm long, 0.7-1.2 mm wide, pilose, the 5 lanceolate lobes 0.7-1.8 mm long, dividing the tube nearly to the base; flowers yellowish, 1.5-2 mm long, hispidulous or glandular without, the tepals mostly oblong, those of the inner whorl only slightly narrower; achenes light brown, 1.5-1.8 mm long.---In scattered locations, often on heavy gumbo clay slopes or flats in e. Utah from Uintah Co. s. to Kane and San Juan cos., and in isolated locations

as in Sevier Co. and Lincoln Co., Nev.; sw. Wyo. s. through e. Utah and w. Colo. to nw. N.M. and n. Ariz. Jun-Sep.

72. *E. PUBERULUM* S.Wats. [*E.p. var. venosum* S.Stokes.] Low spreading herbaceous annuals 0.5-3 dm high; leaves basal, obovate to rounded, 0.5-1.5 cm long and wide, sparsely villous on both surfaces, the petiole 0.5-2 cm long; stems erect or spreading, 3-8 cm long, silky-puberulent; inflorescences spreading, 0.5-2.5 dm long, silky-puberulent, often with highly reduced, bract-like leaves at the lower nodes; involucre turbinate, 1-1.5 mm long, 0.6-1 mm wide, villous, the 4 oblong lobes dividing the tube nearly to the base; flowers white to red, 1-1.5 mm long, glabrous or hispidulous without, the tepals slightly dimorphic, those of the outer whorl obcordate, those of the inner whorl narrower; achenes light brown, 1 mm long.---Infrequent to rare on sandy to gravelly soil in sw. Utah; central and se. Nev. Jun-Aug.

An Arizona species which might be found in southern Utah is *Eriogonum darrovii* Kearney. It differs from the above two species in having the tepals of the outer whorl fan-shaped and hooded, and being sericeous and leafy throughout. This species occurs just south of the Utah line in Coconino and Mojave cos. south of Fredonia, and would be expected to occur in sandy soil in the pinyon-juniper woodlands of Kane Co.

## INDEX

The following list of names is supplied to all entities mentioned in this treatment. Names in **bold face type** are acceptable names; those in *italics* are synonyms. The number refers to the species under which the taxon is mentioned or discussed.

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## ACKNOWLEDGMENTS

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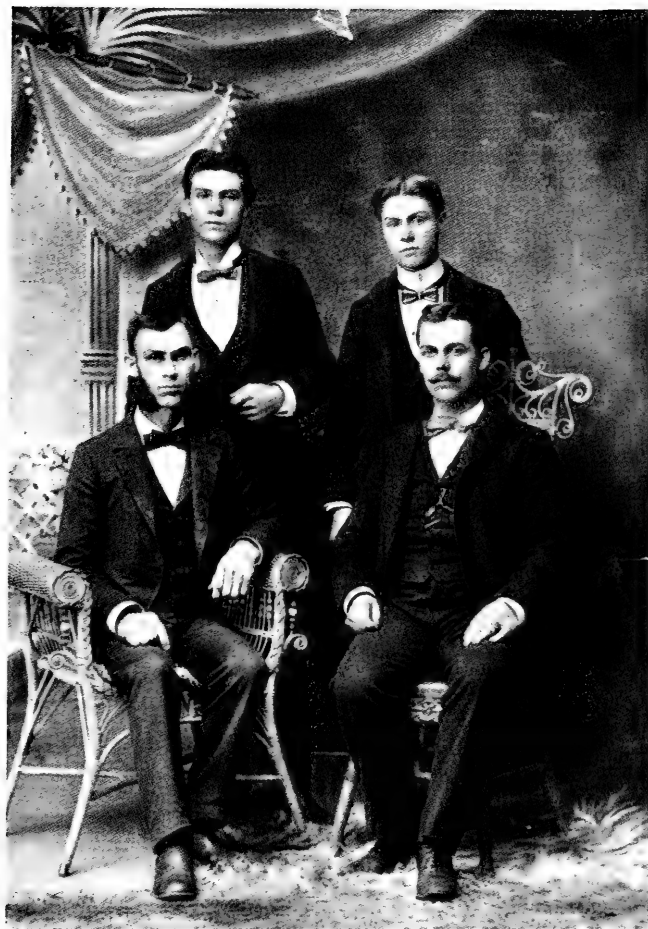
FRED JAY SEAVER, 1877-1970

Otto Degener, N.Y. Bot. Garden

One of the most respected and beloved members of the staff of the New York Botanical Garden was the mycologist Dr. Fred J. Seaver. I wrote his necrology, with the help of his elder brother Arthur, for *Torreya* 98:172-174. 1971. There I depicted the two brothers, bent with age, standing side by side in 1968.

Arthur, who was born October 26, 1880 and who had his driver's license renewed November 1972, recently wrote me that "The other day when going through some boxes of old stuff I came across a picture of Fred and me and our two older brothers - - - it shows Fred at the age of 17 or 18. He is the one on the left standing - looking like a solemn preacher or school teacher. - - - Fred and I used to work for 5¢ per hour when we could find anyone who had work to do and had a few nickels to spare. I worked for one old man who raised sweet corn to sell for 10¢ per dozen. He was paying me 5¢ per hour and I would be working as hard as I could with a stream of sweat running off my nose and he would come out and say 'Can't you work a little faster?'"

I herewith show the photograph of these two men, the type who worked hard, lived long, and made America the great Nation in Science and Industry that it is today.



NOTES ON NEW AND NOTEWORTHY PLANTS. LVI

Harold N. Moldenke

*AEGIPHILA BOGOTENSIS* f. *TERNATA* Moldenke, f. nov.

Haec forma a forma typica speciei foliis ternatis differt.

This form differs from the typical form of the species in having its leaves regularly ternate.

The type of the form was collected by Friedrich Carl Lehmann (B.T. 690) somewhere in Colombia, and is deposited in the Britton Herbarium at the New York Botanical Garden. Previously this collection was misidentified as *A. ternifolia* (H.B.K.) Moldenke and was so cited by me in previous publications. My friend and colleague, Dr. López-Palacios, will write further about this matter in a publication now in preparation by him.

*KALAHARIA UNCINATA* var. *PARVIFLORA* (Schinz) Moldenke, comb. nov.

*Clerodendron spinescens* var. *parviflora* (Schinz) Gürke in Engl., Bot. Jahrb. 18: 181. 1893.

*LANTANA MINASENSIS* var. *PUBERULENTA* Moldenke, var. nov.

Haec varietas a forma typica speciei foliis subtus pilis valde brevioribus.

This variety differs from the typical form of the species in having the pubescence on the lower leaf-surfaces much shorter, only puberulent, and visible only under a hand lens; tiny resinous globules are scattered over the surface among the microscopic hairs.

The type of this variety was collected by W. R. Anderson, M. Stieber, and J. H. Kirkbride, Jr. (no. 37123) in cerrado near limestone boulders about 5 km. west of Cocos, at an altitude of about 530 meters, on the Planalto do Brasil, Bahia, Brazil, on March 17, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as a shrub, 3--4 m. tall, the corollas orange, and the fruit green, maturing blue.

*STACHYTARPHETA DIAMANTINENSIS* Moldenke, sp. nov.

Frutex, ramis ramulisque numerosis dense breviterque pubescentibus; foliis parvis oblanceolatis vel spathulatis 1--2 cm. longis 5--8 mm. latis apicem versus tridentatis utrinque dense breviterque pubescentibus; spicis terminalibus brevibus densis 2--2.5 cm. longis ca. 1.5 cm. latis per omnes partes dense pubescentibus.

Shrub, about 0.5 m. tall, much branched; branches and branchlets slender, at first densely short-pubescent, the pubescence wearing off in age; internodes much abbreviated, mostly about 1 cm. long; leaves numerous, restricted to the flowering branchlets, decussate-opposite, small, oblanceolate or spatulate, 1--2 cm.

long, 5--8 mm. wide toward the apex, cuneately attenuate to the base, sessile or obscurely short-petiolate, obtuse or bluntly acutish at the apex, mostly decidedly 3-toothed toward the apex with bluntish antrorse teeth, the smaller ones often revolute, densely short-pubescent on both surfaces with brownish hairs; veinlet reticulation rather conspicuous beneath; inflorescence spicate, terminal, sessile or subsessile, short and dense, 2--2.5 cm. long, about 1.5 cm. wide, many-flowered; bracts oblong, densely short-pubescent, equaling the calyx, subacute at the apex; calyx cylindric, about 1 cm. long, densely short-pubescent, 5-ribbed, 5-toothed at the apex with erect apiculate teeth; corolla hypocrateriform, its tube dark-blue, about 1.5 cm. long, the lobes light-blue.

The type of this species was collected by W. R. Anderson, M. Stieber, and J. H. Kirkbride, Jr. (no. 35436) near a stream about 5 km. southwest of Diamantina, Município of Diamantina, at km. 350 on M. G. 259, in the Serro do Espinhaço, on the Planalto do Brasil, Minas Gerais, Brazil, on February 5, 1972, in an area of gently sloping open hillsides with sandy soil and sandstone boulders, mostly wet with seeping water, and a rocky area at the base of the hills, altitude 1300 meters, and is deposited in my personal herbarium at Plainfield, New Jersey.

STACHYTARPHETA LACUNOSA var. ANGUSTIFOLIA Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum ellipticis vel suboblanceolatis angustioribus 1--2.3 cm. latis recedit.

This variety differs from the typical form of the species in having its leaf-blades elliptic or almost oblanceolate, narrower, regularly 1--2.3 cm. wide, densely pubescent on the lower surface, more lightly so on the upper surface.

The type of the variety was collected by Gert Hatschbach (no. 30115) on Pico Itambé, Município São Antonio de Itambé, Minas Gerais, Brazil, at 1800 meters altitude, on August 9, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector describes the plant as a shrub 1.5 m. tall, with blue flowers, and found it growing on "matinha beira campo".

STACHYTARPHETA LACUNOSA var. CORDIFOLIA Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum ad basin cordatis differt.

This variety differs from the typical form of the species in having its leaf-blades cordate at the base.

The type of the variety was collected by H. S. Irwin, R. Reis dos Santos, R. Souza, and S. D. de FONSECA (no. 23029) in an area of outcrops and steep rocky slopes with cerrado, at 1100 m. altitude, about 30 km. northeast of Francisco Sá, on the road to Salinas, in the Serra do Espinhaço, on the Planalto do Brasil, Minas Gerais, Brazil, on February 10, 1969, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collectors describe the plant as a brittle subshrub to about 1 m.

tall, the corollas being dark metallic-blue.

*STACHYTARPHETA LACUNOSA* var. *OVATIFOLIA* Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum ovalibus vel ovatis recedit.

This variety differs from the typical form of the species in having its leaf-blades definitely oval or ovate in outline and not cuneately attenuate at the base.

The type of the variety was collected by H. S. Irwin, R. Reis dos Santos, R. Souza, and S. F. da Fonsêca (no. 23871) on cerrado slopes at 950 m. altitude about 48 km. west of Montes Claros on the road to Agua Boa, in the Serra do Espinhaço, on the Planalto do Brasil, Minas Gerais, Brazil, on February 25, 1969, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as a subshrub about 1.5 m. tall, the corollas metallic-blue.

*STACHYTARPHETA MATOGROSSENSIS* Moldenke, sp. nov.

Herba erecta 50 cm. alta, caulibus glabris nitidis nigrescentibus, foliis oppositis oblanceolatis 4-6 cm. longis 1.5-2 cm. latis utrinque glabris nigrescentibusque, ad apicem acutis vel rotundatis, sessilibus basin versus late attenuatis, margine supra mediam argute serratis, spicis pergracilibus usque ad 40 cm. longis per omnes partes glabris nitidisque nigrescentibusque.

Erect herb, about 50 cm. tall, apparently sparsely branched; stems and branches subtetragonal, completely glabrous, very shiny, blackening in drying; principal internodes 3.5-5 cm. long; leaves decussate-opposite, blackening in drying, thin-chartaceous, oblanceolate, 4-6 cm. long, 1.5-2 cm. wide, widest above the middle, sessile, acute or rounded at the apex, broadly attenuate to the subamplexicaul base, more or less sharply and antrorsely serrate from about the middle to the apex; inflorescence spicate, terminal and terminating a pair of terminal branches, to 40 cm. long, very slender, rather densely many-flowered, not over 1 cm. wide during anthesis, 3 mm. wide before and after anthesis, completely glabrous in all its parts; peduncles resembling the branches and stems, about 6 cm. long, glabrous, nigrescent, shiny; rachis similar to the peduncles in all respects; bractlets lanceolate, about 1 cm. long, aristate-attenuate at the apex, completely glabrous, shiny, nigrescent, sometimes slightly scarious-margined; calyx cylindric, 8-12 mm. long, glabrous, nigrescent; corolla hypocrateriform, violet, with a central white "eye".

The type of this species was collected by Gert Hatschbach (no. 29523) "dos lageados da base dos morros", in the Serra de Urucum, Município Corumba, Mato Grosso, Brazil, on April 15, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey.

*STACHYTARPHETA VISCIDULA* var. *BREVIPILOSA* Moldenke, var. nov.

Haec varietas a forma typica speciei pilis ramulorum valde brevioribus recedit.

This variety differs from the typical form of the species in

having the pubescence on its branchlets and twigs very much shorter.

The type of the variety was collected by W. R. Anderson, M. Stieber, and J. H. Kirkbride, Jr. (no. 35918) on the eastern slopes of Pico do Itambé, at 1310 m. altitude, in an area of steep-sided grassy, shrubby, or wooded slopes with sandstone outcrops, sloping down to a deep shaded box-canyon with vertical walls and subterranean drainage, in the Serra do Espinhaço, on the Planalto do Brasil, Minas Gerais, Brazil, on February 13, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as a shrub, 0.5 m. tall, with bluish-purple corollas.

*SYNGONANTHUS NITENS* var. *VIVIPARUS* Moldenke, var. nov.

Haec varietas a forma typica speciei recedit pedunculis 5--15 cm. longis, laminis ca. 1 cm. longis, et capitulis saepe viviparis.

This variety differs from the typical form of the species in its much smaller stature, the leaves only about 1 cm. in length, the peduncles 5--15 cm. long, and the flower-heads often conspicuously viviparous with the involucre bractlets becoming leaf-like and 1--8 one-pedunculate plants 2--3 cm. tall developing per head.

The type of this variety was collected by H. S. Irwin, R. M. Harley, and G. L. Smith (no. 32510) in wet ground of disturbed woodland on sand with outcrops, at about 1100 m. altitude, Rio Ferro Doido, about 18 km. east of Morro do Chapéu, Serra do Tombador, on the Planalto do Brasil, Bahia, Brazil, on February 18, 1971, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as a "Rosette herb, the heads to ca. 7 cm high, light gray".

*SYNGONANTHUS PROLIFER* var. *PARVUS* Moldenke, var. nov.

Haec varietas a forma typica speciei foliis 2 cm. longis et pedunculis 7--11 cm. longis recedit.

This variety differs from the typical form of the species in its much smaller habit, the leaves being only to about 2 cm. long and the peduncles only 7--11 cm. long.

The type of the variety was collected by J. B. Silva (no. 595) at Lagoinha, altitude 1350 m., Município Diamantina, Minas Gerais, Brazil, on April 13, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector describes the plant as an herb 10 cm. tall, with white flower-heads, and found it to be very frequent on sandstone outcrops.

*SYNGONANTHUS ULEI* var. *GOYAZENSIS* Moldenke, var. nov.

Haec varietas a forma typica speciei foliis non rosulatis paucioribus vaginis usque ad 2 cm. longis et laminis non gibbosis recedit.

This variety differs from the typical form of the species in its leaves being less numerous, not densely rosulate nor appressed

to the ground, the sheaths to 2 cm. long, with the free blade at their apex not at all ampliate-gibbous at the base, and the peduncles 4-9 [mostly 6] cm. long.

The type of this variety was collected by H. S. Irwin, R. M. Harley, and G. L. Smith (no. 32664) in white sand of disturbed gallery margin in a region of gallery forest and adjacent wet campo (brejo), at an altitude of about 1250 m., about 20 km. north of Alto do Paraíso, Chapada dos Veadeiros, on the Planalto do Brasil, Goiás, Brazil, on March 19, 1971, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors refer to the plant as a "Rosette herb, the inflorescences to ca. 6 cm tall. Heads white."

*SYNGONANTHUS WEDDELLII* var. *GRACILIS* Moldenke, var. nov.

Haec varietas a forma typica speciei foliis gracilioribus usque ad 3 cm. longis perspicue longiterque villosis et capitulis nigrescentibus recedit.

This variety differs from the typical form of the species in its leaves being longer and more slender, to 3 cm. long, long-attenuate to the sharply aristate apex, very conspicuously long-villous with wide-spreading, irregular, whitish hairs on all but the oldest ones, and the mature fruiting-heads blackish.

The type of this variety was collected by H. S. Irwin, W. R. Anderson, M. Stieber, and E. Y.-T. Lee (no. 34259) on rocky slopes, Serra dos Pireneus, at an altitude of 1000 m., about 18 km. east of Pirenópolis, on the Planalto do Brasil, Goiás, Brazil, on January 15, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors note that most of the plants at this locality were in an immature stage and that it was common in a sedge meadow at the type locality.

*SYNGONANTHUS XERANTHEMOIDES* var. *STRIGILLOSUS* Moldenke, var. nov.

Haec varietas a forma typica speciei vaginis pedunculisque dense albido-strigillosis et bracteis involucribus fusco-brunneis recedit.

This variety differs from the typical form of the species in having the sheaths very densely and conspicuously white-strigillose with closely appressed plainly antrorse hairs from base to apex, the peduncles also appressed-strigillose but somewhat less densely so, less conspicuously (except under a handlens) and less regularly antrorsely appressed, and the involucrial bractlets dark-brownish or castaneous in color.

The type of this variety was collected by J. B. Silva (no. 578) at Serra Negra, Município Itamarandiba, at an altitude of 1300 meters, Minas Gerais, Brazil, on April 11, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector describes the plant as "lenhosa, cespitosa, pedúnculos até 40 cm., caule subterrâneo alaranjados, muito frequente".

A FIFTH SUMMARY OF THE VERBENACEAE, AVICENNIACEAE, STILBACEAE,  
DICRASTYLIDACEAE, SYMPHOREMACEAE, NYCTANTHACEAE, AND  
ERIOCAULACEAE OF THE WORLD AS TO VALID TAXA, GEOGRAPHIC  
DISTRIBUTION, AND SYNONYMY

Supplement 2

Harold N. Moldenke

Addenda & errata to Part I:

CANADA:

Québec:

Eriocaulon pellucidum Michx. [Missisquoi County]

UNITED STATES OF AMERICA:

Pennsylvania:

Verbena simplex Lehm. [Bucks County]

Maryland:

Eriocaulon pellucidum Michx. [Anne Arundel County]

Virginia:

Verbena simplex Lehm. [Warren County]

North Carolina:

Verbena hastata L. [Avery County]

South Carolina:

Lantana camara L. [Georgetown County]

Verbena brasiliensis Vell. [Georgetown County]

Verbena rigida Spreng. [Georgetown County]

Vitex agnus-castus L. [Georgetown County]

Georgia:

Callicarpa americana L. [Henry & Pike Counties]

Eriocaulon compressum Lam. [Telfair County]

Eriocaulon decangulare L. [Tatnall County]

Syngonanthus flavidulus (Michx.) Ruhl. [Brantley County]

Eriocaulon decangulare L. [Tatnall County]

Verbena brasiliensis Vell. [Henry & Rockdale Counties]

Verbena rigida Spreng. [Henry & Rockdale Counties]

Verbena urticifolia L. [Henry & Rockdale Counties]

Florida:

Avicennia germinans (L.) L. [Grassy Key]

Eriocaulon decangulare L. [Alachua County]

Lachnocaulon engleri Ruhl. [Okaloosa County]

Lachnocaulon engleri var. caulescens Moldenke [Escambia  
County]

Lachnocaulon minus (Chapm.) Small [Taylor County]

Syngonanthus flavidulus (Michx.) Ruhl. [Marco Island]

Alabama:

Eriocaulon compressum var. harperi Moldenke [Baldwin &  
Washington Counties]

## Alabama (continued):

- Lachnocaulon anceps (Walt.) Morong [Conecuh County]  
Lachnocaulon engleri Ruhl. [Baldwin County]  
Lachnocaulon engleri var. caulescens Moldenke [Baldwin County]  
Verbena rigida Spreng. [Tuscaloosa County]

## Iowa:

- Phyla lanceolata (Michx.) Greene [Chickasaw County]  
Verbena bracteata Lag. & Rodr. [Floyd & Tama Counties]  
Verbena hastata L. [Benton, Black Hawk, Bremer, & Grundy Counties]  
Verbena simplex Lehm. [Bremer, Buchanan, & Linn Counties]  
Verbena stricta Vent. [Bremer & Grundy Counties]  
Verbena urticifolia L. [Benton, Buchanan, Cerro Gordo, Floyd, Grundy, Howard, & Winneshiek Counties]

## Kentucky:

- Phyla lanceolata (Michx.) Greene [Trigg County]  
Verbena bracteata Lag. & Rodr. [Trigg County]  
Verbena hastata L. [Trigg County]  
xVerbena hybrida Voss [Lyon County]  
Verbena simplex Lehm. [Trigg County]

## Tennessee:

- Phyla lanceolata (Michx.) Greene [Stewart County]  
Verbena urticifolia L. [Stewart County]

## Minnesota:

- Verbena stricta Vent. [Traverse County]

## South Dakota:

- Verbena stricta Vent. [Union County]

## Arkansas:

- Callicarpa americana L. [Perry County]

## Louisiana:

- Avicennia germinans (L.) L. [Saint Bernard Parish]  
Eriocaulon cinereum R. Br.  
Phyla lanceolata (Michx.) Greene [Saint Charles Parish]

## Oklahoma:

- Callicarpa americana L. [Sequoyah County]

## Texas:

- Callicarpa americana L. [Smith County]  
Eriocaulon decangulare f. parviceps Moldenke -- delete the asterisk  
Phyla nodiflora (L.) Greene [Brewster County]

## California:

- Phyla lanceolata (Michx.) Greene [Bouldin Island]  
Phyla nodiflora var. rosea (D. Don) Moldenke [San Diego County]  
Verbena hastata var. scabra Moldenke [Bouldin Island]

## MEXICO:

- Cornutia grandifolia var. intermedia Moldenke [Chiapas]  
Lantana hispida var. ternata Moldenke -- delete the asterisk  
Lantana notha Moldenke [Coahuila]  
Stachytarpheta guatemalensis var. lundelliana Moldenke -- delete the asterisk

## YUCATÁN ISLANDS:

- Avicennia germinans (L.) L. [Alacran]

## GUATEMALA:

- Lippia controversa Moldenke [Alta Verapaz]  
Lippia hypoleia Briq. [Baja Verapaz]

## BRITISH HONDURAS:

- Eriocaulon kinlochii Moldenke -- delete the asterisk

## GULF OF HONDURAS ISLANDS:

- Lantana involucrata f. rubella Moldenke [Water Cay]

## NICARAGUA:

- Eriocaulon decangulare f. parviceps Moldenke [Cabo Gracias a Díos & Zelaya]  
Eriocaulon kinlochii Moldenke [Zelaya]  
Lantana camara L. [Cabo Gracias a Díos]  
Lantana chiapasensis Moldenke [Matagalpa]  
Lantana glandulosissima Hayek [Chontales, Masaya, & Río San Juan]  
Lantana hispida var. ternata Moldenke [Zelaya]  
Lantana maxima Hayek [Granada]  
Lantana trifolia L. [Nueva Segovia & Río San Juan]  
Stachytarpheta guatemalensis var. lundelliana Moldenke [Chontales]  
Tonina fluviatilis Aubl. [Zelaya]

## COSTA RICA:

- Aegiphila anomala Pittier [Cartago]  
Aegiphila deppeana Steud. [Alajuela]  
Stachytarpheta cayennensis (L. C. Rich.) Vahl [Limón]

## BAHAMA ISLANDS:

- Duranta repens L. [Cat]  
Lantana balsamifera Britton [Cat]

## CAYMAN ISLANDS:

- Aegiphila martinicensis Jacq. -- to be deleted  
Citharexylum fruticosum L. [Cayman Brac & Little Cayman]  
Lantana arida Britton -- to be deleted  
Lantana camara L. [Grand Cayman]  
Lantana urticaefolia Mill. [Grand Cayman]  
Lippia alba (Mill.) N. E. Br. [Cayman Brac & Grand Cayman]

## HISPANIOLA:

- Stachytarpheta cayennensis f. albiflora Moldenke [Dominican Republic]

## WINDWARD ISLANDS:

- Lantana reticulata Pers. [St. Lucia]

## SOUTHERN NETHERLANDS ANTILLES:

- Lantana canescens H.B.K. [Aruba & Bonaire]  
Stachytarpheta jamaicensis (L.) Vahl [Curaçao]

## NORTHERN SOUTH AMERICAN ISLANDS:

- Lantana moritziana f. parvifolia Moldenke [Margarita]

## COLOMBIAN CARIBBEAN ISLANDS:

- Avicennia germinans (L.) L. [Providencia]

## COLOMBIA:

- Aegiphila mollis H.B.K. [Arauca]  
Aegiphila panamensis Moldenke [Chocó]  
Citharexylum poeppigii var. calvescens Moldenke -- delete the asterisk  
Lantana cujabensis Schau. [Arauca]  
Paepalanthus karstenii Ruhl. [Nariño]

## VENEZUELA:

- Aegiphila elata Sw. [Apure; delete "Barinas, Carabobo, & Yaracuy"]  
Aegiphila floribunda Moritz & Moldenke [Lara]  
Aegiphila membranacea Turcz. [Apure]  
Aegiphila parviflora Moldenke [Amazonas]  
Aegiphila venezuelensis var. serrata Moldenke [Yaracuy]  
Citharexylum decorum Moldenke [Falcón & Yaracuy]  
Citharexylum poeppigii Walp. [Apure & Barinas]  
Citharexylum poeppigii var. calvescens Moldenke [Barinas]  
Eriocaulon meridensis Klotzsch [delete "Tolima"]  
Lantana canescens H.B.K. [Lara]  
Lantana moritziana f. parvifolia Moldenke [Mérida]  
Lantana pittieri Moldenke [Carabobo & Mérida]  
Lantana trifolia L. [Barinas]  
Lippia moritzii Turcz. [Lara]  
Paepalanthus lamareckii Kunth [Angostura]  
Petrea glandulosa Pittier [Táchira]  
Petrea pubescens f. albicalyx Moldenke -- to be deleted  
Phyla betulaeifolia (H.B.K.) Greene [Zulia]  
Priva lappulacea f. albiflora Moldenke [Zulia]  
Stachytarpheta cayennensis (L. C. Rich.) Vahl [Zulia]  
Stachytarpheta cayennensis f. albiflora Moldenke [Barinas]  
Stachytarpheta elatior var. germani Moldenke [Apure]  
Tonina fluviatilis f. parvifolia Moldenke [Amazonas]\*  
Vitex divaricata Sw. [Mérida & Zulia]

## PERU:

- Aegiphila cuneata Moldenke [Madre de Dios]  
Lantana scabiosaeflora f. albida Moldenke [delete "Moquegua"]  
Lantana zahlbruckneri Hayek [Moquegua]  
Verbena tenuisecta Briq. -- to be deleted

## BRAZIL:

- Aegiphila mediterranea Vell. [delete "São Paulo"]

## BRAZIL (continued):

- Aegiphila parviflora Moldenke [Bahia]  
Aegiphila vitelliniflora Klotzsch [delete "Roraima"]  
Citharexylum poeppigii Walp. [Arapari Island]  
Eriocaulon densum Colla — to be deleted  
Eriocaulon densum Mart.\*  
Eriocaulon linearifolium Körn. [Bahia]  
Eriocaulon melanocephalum Kunth [Goiás]  
Ghinia curassavica var. australis Moldenke [Bahia]\*  
Lantana aristata (Schau.) Briq. [Bahia; Balsas Island]  
Lantana camara var. angustifolia Moldenke [São Paulo]  
Lantana minasensis var. puberulenta Moldenke [Bahia]\*  
Lantana tiliaefolia Cham. [Balsas Island]  
Leiothrix flavescens var. parvifolia Moldenke [Minas Gerais]\*  
Leiothrix hatschbachii Moldenke [Minas Gerais]\*  
Lippia affinis Schau. [Goiás]  
Lippia arechavaletae Moldenke [Mato Grosso]  
Lippia eupatorium var. angustifolia Moldenke [Goiás]  
Lippia intermedia Cham. -- delete the asterisk  
Lippia linearifolia Moldenke [Minas Gerais]\*  
Lippia rubiginosa Schau. [Maranhão]  
Lippia schomburgkiana Schau. [Minas Gerais]  
Lippia turnerifolia Cham. [Mato Grosso]  
Paepalanthus argillicola var. pilosus Moldenke [Guanabara]\*  
Paepalanthus elongatus var. niger Moldenke [Goiás]\*  
Paepalanthus glabrifolius Ruhl. [delete "Minas Gerais"]  
Paepalanthus gleasonii Moldenke [Roraima; delete "Rio Negro"]  
Paepalanthus globulifer Alv. Silv. [Santa Catarina & São Paulo]  
Paepalanthus gounelleanus Beauverd [Rio de Janeiro; delete "Minas Gerais"]  
Paepalanthus hilairei var. pohlianus Moldenke [Goiás & Minas Gerais]\*  
Paepalanthus langsdorffii var. chapadensis Moldenke [Minas Gerais]\*  
Paepalanthus manicatus V. A. Pouls. [Bahia]  
Paepalanthus myophyllus Alv. Silv. — to be deleted  
Paepalanthus polyanthus (Bong.) Kunth [Marinheiros Island]  
Paepalanthus polytrichoides Kunth [Minas Gerais]  
Philodice cuyabensis (Bong.) Körn. [Goiás]  
Stachytarpheta australis Moldenke [Amazônas]  
Stachytarpheta chapadensis Moldenke [Goiás]\*  
Stachytarpheta diamantinensis Moldenke [Minas Gerais]\*  
Stachytarpheta lacunosa var. angustifolia Moldenke [Minas Gerais]\*  
Stachytarpheta lacunosa var. cordifolia Moldenke [Minas Gerais]\*

## BRAZIL (continued):

Stachytarpheta lacunosa var. ovatifolia Moldenke [Minas Gerais]\*

Stachytarpheta laevis Moldenke [Santa Catarina]

Stachytarpheta linearis Moldenke [Minas Gerais]\*

Stachytarpheta matogrossensis Moldenke [Mato Grosso]\*

Stachytarpheta maximiliani var. glabrata Schau. [Goiás]

Stachytarpheta prostrata Glaz. -- to be deleted

Stachytarpheta viscidula var. brevipilosa Moldenke [Minas Gerais]\*

Syngonanthus appressus var. chapadensis Moldenke [Goiás]\*

Syngonanthus aquaticus var. caespitosus Moldenke [Amazonas]\*

Syngonanthus bahiensis Moldenke [Bahia]\*

Syngonanthus bracteosus Moldenke [Minas Gerais]\*

Syngonanthus breviramis C. Diogo -- to be deleted

Syngonanthus candidus var. bahiensis Moldenke [Bahia]\*

Syngonanthus centauroides var. subappressus Ruhl. [delete "Rio Grande do Sul"]

Syngonanthus chrysanthus (Bong.) Ruhl. [Santa Catarina Island]

Syngonanthus densiflorus var. glabrifolius Moldenke [Goiás]\*

Syngonanthus densifolius var. majus Moldenke [Goiás]\*

Syngonanthus gracilis var. amazonicus Ruhl. [Amazonas]

Syngonanthus nitens var. viviparus Moldenke [Bahia]\*

Syngonanthus prolifer var. parvus Moldenke [Minas Gerais]\*

Syngonanthus pulchellus Moldenke [Minas Gerais]\*

Syngonanthus ulei var. goyazensis Moldenke [Goiás]\*

Syngonanthus weddellii var. gracilis Moldenke [Goiás]\*

Syngonanthus xeranthemoides var. strigillosus Moldenke [Minas Gerais]\*

Verbena ovata Cham. [Paraná]

Vitex regnelliana Moldenke [Minas Gerais]

Vitex schomburgkiana Schau. [Roraima]

## BOLIVIA:

Lantana canescens H.B.K. [Tarija]

Lantana micrantha f. violacea Moldenke [Tarija]

Lippia dumetorum Herzog [Tarija]

## ARGENTINA:

Citharexylum myrianthum Cham. [Corrientes]

Lippia intermedia Cham. [Misiones]

Vitex megapotamica (Spreng.) Moldenke [Corrientes]

## MACARONESIA:

Lantana camara var. aculeata (L.) Moldenke [Pico]

Lantana tiliaefolia Cham. [São Miguel]

## ITALY:

Eriocaulon cinereum R. Br.

## UNION OF SOVIET SOCIALIST REPUBLICS:

Eriocaulon cinereum R. Br. [Tadzhikskaya]

## UNION OF SOVIET SOCIALIST REPUBLICS (continued):

Verbena officinalis var. densiflora Regel & Winkler [Turkmen-  
kaya]\*

## SUDAN:

Priva meyeri Jaub. & Spach

## ERITREA:

Eriocaulon abyssinicum Hochst.

## REPUBLIC OF SOMALI:

Cyclocheilon eriantherum var. decurrens Chiov.\*

Cyclocheilon physocalyx Chiov.\*

## SIERRA LEONE:

Lantana rugosa Thunb.

## IVORY COAST:

Mesanthemum radicans (Benth.) Körn.

## GHANA:

Clerodendrum myricoides (Hochst.) R. Br.

Clerodendrum philippinum var. simplex Moldenke

Eriocaulon bongense Engl. & Ruhl.

Eriocaulon togoense Moldenke

## CENTRAL AFRICAN REPUBLIC:

Mesanthemum radicans (Benth.) Körn.

## BURUNDI:

Clerodendrum cordifolium (Hochst.) A. Rich.

Eriocaulon bifistulosum Van Heurck & Muell.-Arg.

Eriocaulon bucharanii Ruhl.

Eriocaulon inundatum Moldenke

Eriocaulon zambesiense Ruhl.

Stachytarpheta angustifolia (Mill.) Vahl

Stachytarpheta indica (L.) Vahl

Syngonanthus poggeanus Ruhl.

Syngonanthus wahlbergii (Wikstr.) Ruhl.

## UGANDA:

Eriocaulon friesiorum Bullock

Eriocaulon mesanthemoides Ruhl.

Lantana rugosa Thunb.

Lantana scabrifolia Moldenke

Lantana tiliaefolia Cham.

## ZAMBIA:

Kalaharia uncinata var. parviflora (Schinz) Moldenke\*

Kalaharia uncinata f. rubra Moldenke

Mesanthemum erici-rosenii T. Fries [Moswala Island]

Syngonanthus poggeanus Ruhl.

## SOUTH AFRICA:

Lantana tiliaefolia Cham. [Transvaal]

## MADAGASCAR:

Eriocaulon bipetalum Good\*

## ARABIA:

- Phyla nodiflora (L.) Greene [Hejaz]  
Premna resinosa (Hochst.) Schau. [Hejaz]  
Verbena officinalis L. [Hejaz]

## IRAN:

- Vitex trifolia L.

## AFGHANISTAN:

- Eriocaulon cinereum R. Br.  
Phyla nodiflora var. reptans (Spreng.) Moldenke

## PAKISTAN:

- Clerodendrum phlomidis L. f. [Baluchistan]

## BHUTAN:

- Eriocaulon cinereum R. Br.

## INDIA:

- Avicennia marina (Forsk.) Vierh. [Kerala]  
Callicarpa longifolia f. floccosa Schau. [Assam]  
Clerodendrum calamitosum L. [Kerala]  
Clerodendrum japonicum (Thunb.) Sweet [Assam]  
Eriocaulon duthiei Hook. f. -- delete the asterisk  
Eriocaulon elenoriae Fyson [Kerala]  
Gmelina arborea L. [Maharashtra]  
Lantana camara var. aculeata (L.) Moldenke [Assam]  
Nyctanthes arbor-tristis L. [Gujarat]  
Verbena bonariensis L. [Rajasthan]  
Vitex negundo L. [Himachal Pradesh]

## MALDIVE ISLANDS:

- Lantana camara L. [Gan]  
Phyla nodiflora (L.) Greene [Gan]  
Stachytarpheta jamaicensis (L.) Vahl [Hittadu]

## CEYLON:

- Clerodendrum indicum (L.) Kuntze  
Eriocaulon fluviatile Trimen -- delete the asterisk  
Premna procumbens Moon

## CHINESE COASTAL ISLANDS:

- Callicarpa nudiflora var. angustifolia Metc. [Hainan]\*

## HONGKONG:

- Eriocaulon fluviatile Trimen

## THAILAND:

- Eriocaulon escape Hansen\*

## INDOCHINA:

- Clerodendrum schmidtii C. B. Clarke [South Vietnam]  
Eriocaulon australe R. Br. [Cambodia]  
Eriocaulon brownianum Mart. [Cochinchina]  
Eriocaulon duthiei Hook. f. [Tonkin]  
Eriocaulon fluviatile Trimen [Annam & Tonkin]  
Eriocaulon infirmum Steud. [Cochinchina]  
Eriocaulon intermedium Körn. [Cochinchina]

## INDOCHINA (continued):

- Eriocaulon miserum Körn. [Annam & Tonkin]  
Eriocaulon nautiliforme H. Lecomte [Cochinchina & Laos]  
Eriocaulon oryzetorum Mart. [Cambodia & Cochinchina]  
Eriocaulon quinquangulare L. [Cochinchina]  
Eriocaulon setaceum L. [Annam]  
Eriocaulon truncatum Hamilt. [Cambodia & Cochinchina]  
Eriocaulon ubonense H. Lecomte [Laos]  
Eriocaulon willdenovianum Moldenke [Tonkin]  
Vitex pierrei Craib [South Vietnam]

## JAPAN:

- Callicarpa dichotoma (Lour.) K. Koch [Miyajima]  
Eriocaulon nasuense Satake [Honshu]\*

## OKI ISLANDS:

- Vitex trifolia var. simplicifolia Cham. [Dōgo & Dōzen]

## RYUKYU ISLAND ARCHIPELAGO:

- Callicarpa japonica Thunb. [Irabu & Shimoji]  
Clerodendrum inerme (L.) Gaertn. [Irabu, Miyako, Shimoji, & Taketomi]  
Phyla nodiflora (L.) Greene [Irabu & Shimoji]  
Verbena officinalis L. [Irabu, Miyako, Shimoji, & Taketomi]  
Vitex trifolia var. simplicifolia Cham. [Ikema, Irabu, Iriomote, Miyako, Shimoji, & Taketomi]  
Vitex trifolia var. subtrisecta (Kuntze) Moldenke [Kobama]

## MARIANA ISLANDS:

- Avicennia alba Blume [Guam]

## NEW GUINEA:

- Eriocaulon alpinum Van Royen [Papua]  
Eriocaulon brevipedunculatum var. longipes Moldenke [Territory of New Guinea; delete "West Irian"]  
Gmelina papuana Bakh. [Papua]\*

## NEW CALEDONIAN ISLANDS:

- Oxera pulchella var. sinuata Guillaum. [New Caledonia]\*

## AUSTRALIA:

- Verbena bonariensis L. [Victoria]

## HAWAIIAN ISLANDS:

- Lantana camara L. [North Mokolua]  
Stachytarpheta jamaicensis (L.) Vahl [North Mokolua & Sand]  
Vitex trifolia var. subtrisecta (Kuntze) Moldenke [Maui]

## COOK ISLANDS:

- Vitex trifolia var. bicolor (Willd.) Moldenke [Rarotonga]

## LINE ISLANDS:

- Clerodendrum inerme (L.) Gaertn. [Christmas, Fanning, Hull, & Sydney]  
Stachytarpheta jamaicensis (L.) Vahl [Palmyra]

## CULTIVATED:

- Callicarpa formosana Rolfe [Hawaiian Islands]

## CULTIVATED (continued):

- Callicarpa japonica f. albibacca Hara [District of Columbia, Pennsylvania, & Virginia]  
Callicarpa japonica var. angustata Rehd. [Scotland]  
Callicarpa japonica var. rhombifolia H. J. Lam [England & Maryland]  
Callicarpa macrophylla Vahl [New York & Singapore]  
Clerodendrum paniculatum L. [Sierra Leone]  
Clerodendrum splendens G. Don [Uganda]  
Clerodendrum thomsonae Balf. f. [Guam & Uganda]  
Clerodendrum umbellatum var. speciosum (Dombrain) Moldenke [Uganda]  
Congea tomentosa Roxb. [Sierra Leone]  
Duranta repens L. [Ceylon, Sudan, & Uganda]  
Eriocaulon compressum Lam. [Pennsylvania]  
Eriocaulon magnificum Ruhl. [Pennsylvania]  
Geunsia farinosa Blume [Cuba]  
Gmelina philippensis Cham. [Kenya & Sierra Leone]  
Holmskioldia sanguinea Retz. [Sierra Leone & Uganda]  
Lantana camara L. [Guam & Sudan]  
xLantana camara var. hybrida (Neubert) Moldenke [Guam]  
Lantana camara var. nivea (Vent.) L. H. Bailey [Guam]  
Lantana hispida H.B.K. [Mexico]  
Lantana montevidensis Spreng. [Guam]  
Lantana tiliaefolia Cham. [Uganda]  
Petrea glandulosa Pittier [Venezuela]  
Petrea pubescens f. albicalyx Moldenke -- to be deleted  
Petrea volubilis L. [Kenya, Sierra Leone, Tanganyika, & Uganda]  
Stachytarpheta mutabilis (Jacq.) Vahl [Ceylon]  
Tectona grandis L. f. [Cook Islands, Sierra Leone, & Sudan]  
Verbena abramsii Moldenke [California]  
Verbena barbata Grah. [England]  
Verbena bracteata Lag. & Rodr. [England]  
Verbena canescens H.B.K. [England]  
Verbena elegans H.B.K. [England]  
xVerbena hybrida Voss [Uganda]  
Verbena incisa Hook. [England]  
Verbena intermedia Gill. & Hook. [England]  
Verbena laciniata (L.) Briq. [England]  
Verbena litoralis H.B.K. [England]  
Verbena officinali-venosa Paxt. [England]\*  
Verbena peruviana (L.) Britton [Wisconsin]  
Verbena pulchella f. corolla-albida Paxt. [England]\*  
Verbena scabra Vahl [England]  
Verbena sulphurea D. Don [England]  
Verbena tenuisecta Briq. [Sudan]

## CULTIVATED (continued):

Vitex payos (Lour.) Merr. [Kenya]Vitex trifolia var. bicolor (Willd.) Moldenke [Hawaiian Islands]Vitex trifolia var. simplicifolia Cham. [Hawaiian Islands]

## SOURCE OR NATIVE COUNTRY UNKNOWN:

Eriocaulon kurtzii Tomlinson\*

## FOSSILIZED:

Holmskioldia quilchensis Mathewes & Brooke [Eocene of British Columbia]\*

## Addenda &amp; errata to Part II:

Aegiphila arborescens f. breviflora Schau. = A. integrifolia (Jacq.) Jacks.Aegiphila arborescens f. foemina ♂ breviflora Schau. = A. integrifolia (Jacq.) Jacks.Aegiphila arborescens f. foemina ♂ longiflora Schau. = A. bracteolosa MoldenkeAegiphila arborescens f. longiflora Schau. = A. bracteolosa MoldenkeAegiphila arborescens f. mascula ♂ breviflora Schau. = A. integrifolia (Jacq.) Jacks.Aegiphila arborescens f. mascula ♂ longiflora Schau. = A. bracteolosa MoldenkeAegiphila floribunda Moldenke = A. floribunda Moritz & MoldenkeAegiphila foliis elliptico-acuminatis membranaceis, paniculis terminalibus, calycibus pubescentibus Sw. = A. elata Sw.Aegiphila glandulifera var. pyramidata Moldenke = A. glandulifera var. pyramidata L. C. Rich. & MoldenkeAegiphila graveolens Mart. & Schum. = A. graveolens Mart. & Schau.Aegiphila subthyrsoideum Pittier = Citharexylum subthyrsoideum PittierAloysia scorodonioides Moldenke = A. scorodonioides (H.B.K.) Cham.Aloysia selloi (Briq.) Mold. = A. sellowii (Briq.) MoldenkeAmasonia campestris (Aubl.) Moldenke = A. campestris (Aubl.) MoldenkeAmerina Noronha = Aglaia Lour., MeliaceaeAmerina Raf. = Salix Tourn., SalicaceaeAmerina balduiniana Raf. = Salix sp., SalicaceaeAmerina caroliniana Raf. = Salix caroliniana Michx., SalicaceaeAmerina glandulosa Raf. = Salix pentandra L., SalicaceaeAmerina houstoniana Raf. = Salix nigra Marsh., SalicaceaeAmerina missourica Raf. = Salix sp., SalicaceaeAmerina nigra Raf. = Salix nigra Marsh., SalicaceaeAmerina ternifolia DC. = Aegiphila ternifolia (H.B.K.) P. DC.

- Amerina tinctoria Raf. = Salix meyeriana Rostk., Salicaceae  
Amerina tomentosa Raf. = Salix tomentosa Host, Salicaceae  
Avicennia marina Forsk. = A. marina (Forsk.) Vierh.  
Avicennia officinalis L. sens. lat. = A. marina (Forsk.) Vierh.  
Bouchea fluminensis Mold. = B. fluminensis (Vell.) Moldenke  
Callicarpa globifera Macbr. = Aegiphila integrifolia (Jacq.) Jacks.  
Callicarpa japonica leucocarpa Sieb. = C. japonica f. albibacca  
     Hara  
Callicarpa japonicum Read = C. japonica Thunb.  
Callicarpa longifolia var. laceolaria C. B. Clarke = C. longifolia  
     f. floccosa Schau.  
Callicarpa mollis var. microphylla Nakai = C. mollis var. ramosissima Nakai  
Callicarpa nikoensis Clark = C. japonica var. angustata Rehd.  
Caryopteris Bunge = Caryopteris Bunge  
Caryopteris wallichiana Schau. = Caryopteris odorata (Hamilt.)  
     B. L. Robinson  
Chascanum marrubifolium Fenzl ex Walp. = C. marrubiifolium Fenzl  
Chavachera Forsk. = Lantana L.  
Chavachera viburnoides Forsk. = Lantana viburnoides (Forsk.) Vahl  
Citharexylon poeppigii Walp. = Citharexylum poeppigii Walp.  
Citharexylum guatemalense Gibson = C. hirtellum var. guatemalense  
     Moldenke  
Citharexylum spicatum Rusby = Aegiphila spicata (Rusby) Moldenke  
Citharexylum villosum Willd. = C. fruticosum var. villosum (Jacq.)  
     O. E. Schulz  
Citharoxylum reitui Moldenke = Verbenoxylum reitzii (Moldenke)  
     Troncoso  
Clerodendron Thunb. = Clerodendrum Burm.  
Clerodendron trichotomum Thunb. = Clerodendrum trichotomum Thunb.  
Clerodendron bakeri Gledhill = Clerodendrum schweinfurthii var.  
     bakeri (Gürke) Thomas  
Clerodendron buchholzii Gledhill = Clerodendrum buchholzii Gürke  
Clerodendron polycephalum Gledhill = Clerodendrum polycephalum  
     J. G. Baker  
Clerodendron scandens Gledhill = Clerodendrum umbellatum Poir.  
Clerodendron sinuatum Gledhill = Clerodendrum sinuatum Hook.  
Clerodendron streptocaulon Gledhill = Clerodendrum thyrsocideum  
     Gürke  
Clerodendron thomsonae Gledhill = Clerodendrum thomsonae Balf. f.  
Clerodendron violaceum Gledhill = Clerodendrum violaceum Gürke  
Clerodendron apayacense Quisumb. = Clerodendrum apayoense Quisumb.  
Clerodendron apayoense Quisumb. = Clerodendrum apayoense Quisumb.  
Clerodendron blumeianum var. glabrum H. J. Lam = Clerodendrum  
     buchanani var. glabrum (H. J. Lam) Moldenke  
Clerodendron colebrookianum var. typicum H. J. Lam = Clerodendrum

colebrokianum Walp.

Clerodendron gossweileri R. Good = Clerodendrum gossweileri Exell

Clerodendron incisum var. vinosum Chiov. = Clerodendrum incisum  
var. vinosum Chiov.

Clerodendron indicum L. Kuntze = Clerodendrum indicum (L.) Kuntze

Clerodendron myrianthum Mildbr. = Clerodendrum myrianthum Mildbr.

Clerodendron nigricoides Hochst. = Clerodendrum myricoides

(Hochst.) R. Br.

Clerodendron nyctaginifolium R. Good = Clerodendrum nyctaginaefol-  
ium Good

Clerodendron pithecobium Standl. & Steyerl. = Gibsoniothamnus

cornutus (Donn. Sm.) A. Gentry, Scrophulariaceae — this is  
the corrected entry

Clerodendron porphyrocalyx var. dentata H. J. Lam = Clerodendrum  
porphyrocalyx var. dentatum H. J. Lam

Clerodendron porphyrocalyx var. reflexum H. J. Lam = Clerodendrum  
porphyrocalyx var. reflexum H. J. Lam

Clerodendron simplex G. Don = Clerodendrum umbellatum Poir.

Clerodendron spinescens var. parviflora (Schinz) Gürke = Kala-  
haria uncinata var. parviflora (Schinz) Moldenke

Clerodendron squamatum var. typicum H. J. Lam = Clerodendrum  
kaempferi (Jacq.) Sieb.

Clerodendron trichostomum Wangerin = Clerodendrum trichotomum  
Thunb.

Clerodendrum bolivianum Britton = Aegiphila multiflora Ruiz & Pav.

Clerodendrum capitatum var. capitatum Huber = C. capitatum (Willd.)  
Schum. & Thonn.

Clerodendrum capitatum var. vanderystii Moldenke = C. capitatum  
var. vanderystii Moldenke

Clerodendrum congensis Engl. = C. umbellatum var. congensis (Engl.)  
Moldenke

Clerodendrum discolor var. discolor Lewalle = C. discolor  
(Klotzsch) Vatke

Clerodendrum formicarum Gürke = C. triplinerve Rolfe

Clerodendrum multiflorum G. Don = C. volubile P. Beauv.

Clerodendrum myricoides var. nyansanum Thomas = C. myricoides var.  
nyansanum Thomas

Clerodendrum personii W. G. Wright = C. triphyllum var. ciliatum  
(H. H. W. Pearson) Moldenke

Clerodendrum phlomitidis Vahl = C. phlomidis L. f.

Clerodendrum phlomidis L. = C. phlomidis L. f.

Clerodendrum pithecobium Standl. & Steyerl. = Gibsoniothamnus  
cornutus (Donn. Sm.) A. Gentry, Scrophulariaceae

Clerodendrum semiserratum Wall. = C. indicum f. semiserratum (Wall.)  
Moldenke

Clerodendrum siphonanthus H. K. = C. indicum (L.) Kuntze

- Clerodendrum splendens var. gilettii (De Wild. & Th. Dur.) Thomas  
 = C. splendens var. giletti (DeWild. & Durand) Thomas
- Clerodendrum triplinerve var. triplinerve Lewalle = C. tripli-  
nerve Rolfe
- Clerodendrum umbellatum var. umbellatum Lewalle = C. umbellatum  
 Poir.
- Cletodendron Swamy & Krishnamurthy = Clerodendrum Burm.
- Cornvtia pyramidata Raeusch. = Cornutia pyramidata L.
- Cornvtia quinata Raeusch. = Vitex quinata (Lour.) F. N. Will.
- Cyclonema myricoides (R. Br.) Hochst. = Clerodendrum myricoides  
 (Hochst.) R. Br.
- Cyclonema myricoides var. sylvaticum (Hochst.) Schau. = Cleroden-  
drum myricoides (Hochst.) R. Br.
- Cyclonema myricoides var. tomentosum Almagia = Clerodendrum dis-  
color (Klotzsch) Vatke
- Cytarexylum mirianthum Cham. = Citharexylum myrianthum Cham.
- Cytharexylum myrianthum Cham. = Citharexylum myrianthum Cham.
- Dupatya hilairei (Körn.) Kuntze = Paepalanthus hilairei Körn.
- Dupatya hilairei Kuntze = Paepalanthus hilairei Körn.
- Dupatya ithyphylla Kuntze = Paepalanthus ithyphyllus (Mart.)  
 Mart. -- this is the corrected entry
- Dupatya ithyphylla Kuntze = Paepalanthus ithyphyllus (Mart.)  
 Mart. -- this is the corrected entry
- Dupatya ithyphylla (Mart.) Kuntze = Paepalanthus ithyphyllus  
 (Mart.) Mart. -- this is the corrected entry
- Dupatya macrorrhiza (Bong.) Kuntze = Paepalanthus macrorrhizus  
 (Bong.) Kunth
- Duranta triacantha Juss. = D. triacantha A. L. Juss.
- Dvranta mutisii Raeusch. = Duranta mutisii L. f.
- Dvranta plumieri Raeusch. = Duranta repens L.
- Ehretia ternifolia Humb. & Bonpl. = Aegiphila ternifolia (H.B.K.)  
 Moldenke
- Ehretia ternifolia Humb. & Kunth = Aegiphila ternifolia (H.B.K.)  
 Moldenke
- Ehretia ternifolia Kunth = Aegiphila ternifolia (H.B.K.) Moldenke
- Ehretia tomentosa Humb. & Kunth = Aegiphila bogotensis (Spreng.)  
 Moldenke
- Ehretia tomentosa Kunth = Aegiphila bogotensis (Spreng.) Moldenke
- Ehretia tomentosa Lam. -- in the Ehretiaceae
- Ehretia tomentosa Roth = E. heynii Lam., Ehretiaceae
- Erdiocalaceae Anon. = Eriocalaceae Lindl.
- Eriocaulon bongardi St. Hil. = Paepalanthus hilairei Körn.
- Eriocaulon capitatum Tessene = Paepalanthus karstenii Ruhl.
- Eriocaulon caulescens Hook. f. = E. atratum var. major Thwaites
- Eriocaulon caulescens Steud. = E. atratum var. major Thwaites
- Eriocaulon cristatum var. bracteis floralibus denticulatis et

longiuscule cuspidato-acuminatis Thwaites & Hook. f. = E. ceylanicum Körn.

Eriocaulon decangulilare Richardson = E. decangulare L.

Eriocaulon densum Colla = E. densum Mart.

Eriocaulon fasciculare L. = Paepalanthus lamarckii Kunth -- this is the corrected entry

Eriocaulon fasciculatum "Lam. (et? Rottb.)" = Paepalanthus lamarckii Kunth

Eriocaulon hamiltonianum Heyne = E. hamiltonianum Mart.

Eriocaulon ithiphyllum Mart. = Paepalanthus ithiphyllum (Mart.) Mart. -- this is the corrected entry

Eriocaulon ithiphyllum Mart. = Paepalanthus ithiphyllum (Mart.) Mart. -- this is the corrected entry

Eriocaulon ithiphyllum Steud. = Paepalanthus ithiphyllum (Mart.) Mart. -- this is the corrected entry

Eriocaulon luzulaefolium Thwaites = E. collinum Hook. f.

Eriocaulon myocephala Mart. = Paepalanthus myocephalus (Mart.) Körn.

Eriocaulon myocephalon Mart. = Paepalanthus myocephalus (Mart.) Körn.

Eriocaulon quinquangulare var. martiana Fyson = E. quinquangulare var. martianum Wall.

Eriocaulon ravenellii Baerecke = E. ravenellii Chapm.

Eriocaulon robustobrownianum Ruhl. = E. robusto-brownianum Ruhl.

Eriocaulon robustum Hook. f. = E. atratum var. major Thwaites

Eriocaulon robustum var. caulescens Hook. f. & Thoms. = E. atratum var. major Thwaites

Eriocaulon robustum Makino = E. robustius (Maxim.) Mak.

Eriocaulon septangulare Sm. = E. aquaticum (J. Hill) Druce

Eriocaulon tortile var. glabra, subsimplex Mart. = Paepalanthus tortilis (Bong.) Mart.

Eriocaulon transvaalensis V. E. Br. = E. transvaalicum N. E. Br.

Eriocaulon truncatum Thw. = E. thwaitesii Körn.

Eriocaulon vivum Burchell = Paepalanthus lamarckii Kunth

Eriocaulon wightianum var. capitulis nigro-cinereis, parce pilosis Thwaites = E. wightianum Mart.

Eriocaulon xeranthemum Mart. = E. xeranthemum Mart.

Eriocaulon (Paepalanthus) affine Bong. = Paepalanthus ramosus var. affinis (Bong.) Ruhl.

Eriocaulon (Paepalanthus) ithiphyllum Mart. = Paepalanthus ithiphyllum (Mart.) Mart.

Eriocaulon (Paepalanthus) maximiliani Mart. = Paepalanthus hilairei Körn.

Eriocaulon (Paepalanthus) myocephalum Mart. = Paepalanthus myocephalus (Mart.) Körn.

- Eriocaulon (Paepalanthus) pygmaeus Mart. = Paepalanthus bifidus (Schrad.) Kunth
- Eriocaulon (Paepalanthus) trinianum Mart. = Leiothrix rufula (A. St.-Hil.) Ruhl.
- Eriocaulon Ohwi = Eriocaulon Gron.
- Eriocaulon sphagnicolum Ohwi = Eriocaulon sphagnicola Ohwi
- Faradaya amicorum Seem. = F. amicorum (Seem.) Seem.
- Geunsia epiphytica (Elm.) H. J. Lam = G. flavida (Elm.) H. J. Lam
- Ghinia tamonea Raeusch. = G. curassavica (L.) Millsp.
- Glandularia guaranitica Troncoso = Verbena guaranitica (Troncoso) Moldenke
- Glandularia Raeusch. = Verbena [Dorst.] L.
- Glandularia caroliniensis Raeusch. = Verbena canadensis (L.) Britton
- Gmelina arborea Wight = G. arborea Roxb.
- Kalaharia spinescens var. parviflora (Schinz) R. E. Fries = K. uncinata var. parviflora (Schinz) Moldenke
- Knoxia scandens foliis cordato-ovatis pedunculis multipartitis alaribus P. Browne = Aegiphila elata Sw.
- Lafuenta ovalis Batt. = Chascanum marrubiifolium Fenzl
- Lantana aculeata flava Desf. = L. camara var. flava (Medic.) Moldenke
- Lantana annua H. K. = L. annua L.
- Lantana camara f. aculeata (Linn.) Moldenke = L. camara var. aculeata (L.) Moldenke
- Lantana camara var. mist (L.) L. H. Bailey = L. camara var. mista (L.) L. H. Bailey
- Lantana camara var. mist. Farnsworth = L. camara var. mista (L.) L. H. Bailey
- Lantana camarca L. = L. camara L.
- Lantana camissonia (D. Dietr.) Benth. & Hook. = L. chamissonis (D. Dietr.) Benth.
- Lantana cinerea Link = L. involucrata L.
- Lantana mearnsii var. mearnsii Lewalle = L. mearnsii Moldenke
- Lantana recta H. K. = L. involucrata L.
- Lantana scabrita Raeusch. = L. camara L.
- Lantana trifida Fedde = L. trifolia L.
- Lantana valutina Mart. & Gal. = L. velutina Mart. & Gal.
- Letraeovitex Merr. = Petraeovitex Oliv.
- Letraeovitex elmeri Merr. = Petraeovitex sumatrana H. J. Lam
- Lippia adoensis Hochst. ex Schau. = L. abyssinica (Otto & Dietr.) Cuf.
- Lippia dauensis Chiov. = L. dauensis (Chiov.) Chiov.
- Lippia geminata microphylla Griseb. = L. alba (Mill.) N. E. Br.
- Lippia scaberrima Souder = L. scaberrima Sond.
- Lippia schliebeni Moldenke = L. schliebeni Moldenke

Manabca Aubl. = Aegiphila Jacq.

Manabca arborescens Aubl. = Aegiphila integrifolia (Jacq.) Jacks.

Paepalanthus caldense Malme = P. caldensis Malme

Paepalanthus decipiens Ruhl. = P. caldensis Malme

Paepalanthus falcatus (Bong.) Körn. = P. pedunculatus (Bong.)

Ruhl.

Paepalanthus falcatus Gardn. = P. geniculatus (Bong.) Kunth

Paepalanthus glaucophyllus Alv. Silv. = P. glaucophyllus Alv.

Silv.

Paepalanthus goncalensis Alv. Silv. = P. goncalensis Alv. Silv.

Paepalanthus grão-mogolensis Alv. Silv. = P. grac-mogolensis Alv.

Silv. -- this is the corrected entry

Paepalanthus henriquei Ruhl. = P. henriquei Alv. Silv. & Ruhl.

Paepalanthus hilaire Körn. = P. hilairei Körn.

Paepalanthus hilairei var.  $\alpha$  Körn. = P. hilairei var. pohlianus

Moldenke

Paepalanthus hilareae Kunth = P. hilairei Körn.

Paepalanthus incanus var.  $\alpha$  Körn. = P. incanus (Bong.) Körn.

Paepalanthus incanus var.  $\phi$  Körn. = P. incanus (Bong.) Körn.

Paepalanthus itatiaiensis var. glabra Ruhl. = P. itatiaiensis var.

glaber Ruhl.

Paepalanthus itatiayensis Ruhl. = P. itatiaiensis Ruhl.

Paepalanthus ithyphyllus Mart. = P. ithyphyllus (Mart.) Mart.

Paepalanthus ithyphyllus Walp. = P. ithyphyllus (Mart.) Mart.

Paepalanthus jordadensis Alv. = P. jordanensis Alv. Silv.

Paepalanthus karsteni Ruhl. = P. karstenii Ruhl.

Paepalanthus langsdorfii Körn. = P. langsdorffii (Bong.) Körn.

Paepalanthus leucoblepharus Ruhl. = P. leucoblepharus Körn.

Paepalanthus lingulatus Kunth = P. lingulatus (Bong.) Kunth

Paepalanthus lutzburgii Herzog = P. lützelburgii Herzog

Paepalanthus magalhãesii Alv. Silv. = P. magalhãesii Alv. Silv.

Paepalanthus milho-verdeensis Alv. Silv. = P. milho-verdensis Alv.

Silv.

Paepalanthus myophyllus Alv. Silv. = P. myriophyllus Alv. Silv.

Paepalanthus nigregens var. pilosa Alv. Silv. = P. nigrescens var.

pilosus Alv. Silv.

Paepalanthus niveoniger Alv. Silv. = P. niveo-niger Alv. Silv.

Paepalanthus obtusifolius Mart. = P. macrocephalus var. minarum

(Körn.) Ruhl.

Paepalanthus (Eriocaulon) ithyphyllus Mart. = P. ithyphyllus

(Mart.) Mart.

Paepalanthus (Eupaepalanthus) klotzschianus Körn. = P. klotzschianus Körn.

Paepalanthus (Eupaepalanthus) oyapockensis Herzog = P. oyapockensis Herzog

Paepalanthus (Eupaep., Vivipari) hippotrichophyllus Herzog = P.

hippotrichophyllus Herzog

Paepalanthus (Leptocephali) pauperrimus Herzog = P. pauperrimus Herzog

Petitia quinduensis Humb. & Kunth = Aegiphila quinduensis (H.B.K.) Moldenke

Petraca Moldenke = Petrea Houst.

Petrae volubilis Anon. = Petrea volubilis L.

Petraea arborea f. albiflora Standl. = Petrea volubilis var. albiflora (Standl.) Moldenke

Petraea volubilis Haust. = Petrea volubilis L.

Petrea mayensis Huber = P. maynensis Huber

Petrea pubescens f. albicalyx Moldenke = P. glandulosa Pittier

Pistaciovitex L. = Vitex Tourn.

Premna arborea Farwell = P. taitensis Schau.

Premna taitensis var. taitensis Zepernick = P. taitensis Schau.

Priva adhaerens a forskalii (Vahl) Chiov. = P. adhaerens (Forsk.) Chiov.

Priva ledtostachya Aitch. = P. cordifolia var. abyssinica (Jaub. & Spach) Moldenke

Priva leptostachya Kobuski = P. adhaerens (Forsk.) Chiov.

Roscoea alpina Royle -- in the Zingiberaceae

Roscoea auriculata K. Schum. -- in the Zingiberaceae

Roscoea blanda K. Schum. -- in the Zingiberaceae

Roscoea brandisii K. Schum. -- in the Zingiberaceae

Roscoea capitata J. E. Sm. -- in the Zingiberaceae

Roscoea capitata var. purpurata Hort. -- in the Zingiberaceae

Roscoea capitata var. purpurea Hort. = P. capitata var. purpurata Hort., Zingiberaceae

Roscoea cautleoides Gagnep. -- in the Zingiberaceae

Roscoea chamaeleon Gagnep. -- in the Zingiberaceae

Roscoea debilis Gagnep. -- in the Zingiberaceae

Roscoea elatior J. E. Sm. -- in the Zingiberaceae

Roscoea exilis J. E. Sm. = R. purpurea J. E. Sm., Zingiberaceae

Roscoea flava Merr. -- in the Zingiberaceae

Roscoea gracilis J. E. Sm. = R. elatior J. E. Sm., Zingiberaceae

Roscoea humana Balf. & Sm. -- in the Zingiberaceae

Roscoea intermedia Gagnep. -- in the Zingiberaceae

Roscoea longifolia Baker -- in the Zingiberaceae

Roscoea lutea Hassk. -- in the Zingiberaceae

Roscoea lutea Royle = R. elatior J. E. Sm., Zingiberaceae

Roscoea nigro-ciliata Hassk. -- in the Zingiberaceae

Roscoea petiolata Royle = Cautleya petiolata Baker, Zingiberaceae

Roscoea praecox K. Schum. -- in the Zingiberaceae

Roscoea procera Wall. = R. purpurea J. E. Sm., Zingiberaceae

Roscoea purpurea J. E. Sm. -- in the Zingiberaceae

- Roscoea sikkimensis Hort. = R. purpurea J. E. Sm., Zingiberaceae  
Roscoea spicata J. E. Sm. — in the Zingiberaceae  
Roscoea tibetica Batalin -- in the Zingiberaceae  
Roscoea yunnanensis Loes. -- in the Zingiberaceae  
Siphonanthus indica Raeusch. = Clerodendrum indicum (L.) Kuntze  
Spartothamnella puberula Maiden = S. puberula (F. Muell.) Maiden  
 & Betcher  
Spartothamnella puberula Maiden & Betcher = S. puberula (F. Muell.)  
 Maiden & Betcher  
Stachytarpheta Fedde = Stachytarpheta Vahl  
Stachytarpheta cayennensis Fedde = Stachytarpheta cayennensis (L.  
 C. Rich.) Vahl  
Stachytarpheta debilis Fedde = xStachytarpheta debilis Dans.  
Stachytarpheta gracilis Fedde = xStachytarpheta gracilis Dans.  
Stachytarpheta indica Fedde = Stachytarpheta indica (L.) Vahl  
Stachytarpheta intercedens Fedde = xStachytarpheta intercedens  
 Dans.  
Stachytarpheta jamaicensis Fedde = Stachytarpheta jamaicensis  
 (L.) Vahl  
Stachytarpheta mutabilis Fedde = Stachytarpheta mutabilis (Jacq.)  
 Vahl  
Stachytarpheta speciosa Fedde = xStachytarpheta trimeni Rech.  
Stachytarpheta trimeni Fedde = xStachytarpheta trimeni Rech.  
Stachytarpha St. = Stachytarpheta Vahl  
Stachytarpha gesnerioides ♂ cuneata Schau. = Stachytarpheta ges-  
nerioides var. cuneata Schau.  
Stachytarpha gesnerioides ♀ rotundata Schau. = Stachytarpheta  
gesnerioides Cham.  
Stachytarpha glabra ♀ angustifolia Schau. = Stachytarpheta glabra  
 var. angustifolia Schau.  
Stachytarpha glabra ♂ latifolia Schau. = Stachytarpheta glabra  
 Cham.  
Stachytarpha jamaicensis Thwaites & Hook. f. = Stachytarpheta  
jamaicensis (L.) Vahl  
Stachytarphaeta urticaefolia (Salisb.) Sims = Stachytarpheta  
urticaefolia (Salisb.) Sims  
Stachytarpheta cayennensis Chod. = S. cayennensis (L. C. Rich.)  
 Vahl  
Stachytarpheta elatio Moldenke = S. elatior Schrad.  
Stachytarpheta elatio var. jermanii Moldenke = S. elatior var.  
jermanii Moldenke  
Stachytarpheta melasanthus Gardn. = S. gardneriana Hayek  
Stachytarpheta orobica Vahl = S. orobica (L.) Vahl  
Stachytarpheta prostrata Glaz. = S. candida Moldenke  
Stereosperma Hook. f. & Thoms. = Vitex Tourn.  
Stereosperma no. 7 Hook. f. & Thoms. = Vitex quinata (Lour.) F. N.  
 Will.

- Syngonanthus biformis Gleason = S. biformis (N. E. Br.) Gleason  
Syngonanthus breviramosus C. Diogo = S. fischerianus (Bong.) Ruhl.  
Syngonanthus caulescens var. procerus (Kl.) Standl. = S. caulescens var. procerus (Klotzsch) Moldenke  
Syngonanthus humboldtii (Kunth) Ruhl. = S. humboldtii (Kunth) Ruhl.  
Syngonanthus oblongus (Körn.) Herzog = S. oblongus (Körn.) Ruhl.  
Syngonanthus plumesus Fedde = S. plumosus Alv. Silv.  
Tectoniae L. = Tectona L. f.  
Tectoniae grandis L. = Tectona grandis L. f.  
Verbena araniana Paxt. = V. incisa Hook.  
Verbena aubletia L. f. = V. canadensis (L.) Britton  
Verbena bonariensis L. = V. bonariensis L.  
Verbena bractiosa Lag. & Rodr. = V. bracteata Lag. & Rodr.  
Verbena clvaata Ruiz & Pav. = V. clavata Ruiz & Pav.  
Verbena forskählei Raeusch. = Priva adhaerens (Forsk.) Chiov.  
Verbena glabrescens (Cham.) Herter = V. gracilescens (Cham.) Herter  
Verbena isabellei Briq. = V. montevidensis Spreng.  
Verbena jamaicensis L. = Stachytarpheta jamaicensis (L.) Vahl  
Verbena mas seu recta & vulgaris Parkinson = V. officinalis L.  
Verbena peruviana rosea Moldenke = V. peruviana f. rosea Moldenke  
Verbena pulchella corolla albida Ulrich = V. pulchella f. corolla-albida Paxt. — this is the corrected entry  
Verbena pulchella corolla-albida Paxt. = V. pulchella f. corolla-albida Paxt.  
Verbena stricta f. albiflora J. B. McFarlin = V. stricta f. albiflora Wadmond  
Verbena trifolia L'Hér. = Aloysia triphylla (L'Hér.) Britton  
Verbena undulata Reitz = Lantana undulata Schrank  
Verbena venosa var. lilacina Jex-Blake = V. rigida var. lilacina (Benary & Bodger) Moldenke  
Verbenaca Camer. = Verbena officinalis L.  
Vitex agnus var. pseud. Hausskn. = V. agnus-castus var. pseudo-negundo Hausskn.  
Vitex agnus castus albidus Desf. = V. agnus-castus f. alba (West.) Rehd.  
Vitex agnus-castus albidus Desf. = V. agnus-castus f. alba (West.) Rehd.  
Vitex agnus-castus ssp. haussknechtii Borrm. = V. hausknechtii Borrm.  
Vitex agnus-castus ssp. haussknechtii var. pseudo-negundo (Hausskn.) Borrm. = V. agnus-castus var. pseudo-negundo Hausskn.  
Vitex lucen Godley = V. lucens T. Kirk  
Vitex negundo f. intermedia (P'ei) Moldenke = V. negundo var. intermedia (P'ei) Moldenke  
Vitex pseudonegundo Hand.-Mazz. = V. agnus-castus var. pseudo-

negundo Hausskn.

Vitex rotundifolia f. heterophylla (Mak.) Kitamura = V. trifolia  
var. subtrisecta (Kuntze) Moldenke

Vitex triflorus Vahl = V. triflora Vahl

Vitex trifolia var. bicolor Moldenke = V. trifolia var. bicolor  
(Willd.) Moldenke

Vitex trifoliata var. variegata Moldenke = V. trifolia var. variegata Moldenke

Verbenaceae Godley = Verbenaceae J. St.-Hil.

Xeractis Körn. = Paepalanthus Mart.

Xeractis dubia Körn. = Paepalanthus lanato-albus Mart.

Zaparia Ph. = Phyla Lour.

Zaparia nodiflora Ph. = Phyla nodiflora var. reptans (Spreng.)  
Moldenke

Zappania globifera (L'Hér.) Desf. = Lippia alba var. globiflora  
(L'Hér.) Moldenke

Some copies of my 974-page two-volume "A Fifth Summary of the Verbenaceae, Avicenniaceae, Stilbaceae, Dicrasyliaceae, Symphoremaceae, Nyctanthaceae, and Eriocaulaceae of the World as to Valid Taxa, Geographic Distribution, and Synonymy", published on December 22, 1971, are still available from Mrs. Alma L. Moldenke, 303 Parkside Road, Plainfield, New Jersey 07060, U.S.A., for \$25 (plus \$1.20 for postage and handling to domestic addresses, \$1.62 for foreign addresses). Supplement 1 was published in Phytologia 23: 413--438 on July 13, 1972. It is planned to publish supplements annually. Collectors and curators of herbaria with material of these groups substantiating new country, island, province, department, county, or parish records are invited to send it to me for verification and for inclusion in future supplements to this summary of forty-four years of research.

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## ADDITIONAL NOTES ON THE ERIOCAULACEAE. XLII

Harold N. Moldenke

## ERIOCAULACEAE Lindl.

Additional & emended bibliography: Trimen, Syst. Cat. Flow. Pl. Ceylon 99 & 124. 1885; J. L. Bennett, Pl. Rhode Isl. 47. 1888; Baerecke, Anal. Key Ferns & Flow. Pl. Atl. Sect. Mid. Fla. 6 & 25. 1906; H. Lecomte, Fl. Gén. Indo-chine 7 (1): 1--18. 1912; T. C. E. & R. E. Fries in R. E. Fries, Wiss. Ergebn. Schwed. Rhod.-Kong.-Exped. 1911-12 Bot. 1: 217--219, pl. 16, fig. 1--4. 1916; Fedtsch., Act. Hort. Bot. Petrop. 38: 236. 1924; W. C. Ferguson, Torreya 25: 110. 1925; Herzog in Fedde, Repert. Spec. Nov. 29: 202--219,

pl. 120 & 121. 1931; Fedde & Schust. in Just, Bot. Jahresber. 57 (2): 15--16. 1937; Fedde in Just, Bot. Jahresber. 57 (2): 773. 1938; Uittien & Heyn in Pulle, Fl. Surin. 1 [Meded. Konink. Ver. Ind. Inst. 30, Afd. Handelsmus. 11]: 213--224. 1938; Wangerin in Just, Bot. Jahresber. 58 (1): 609 [39]. 1938; Fedde & Schust. in Just, Bot. Jahresber. 58 (2): 19 (1938) and 59 (2): 19--20, 213, & 265. 1939; Fedde in Just, Bot. Jahresber. 58 (2): 535. 1939; Lugard, Kew Bull. Misc. Inf. 1939: 104. 1939; Krause in Just, Bot. Jahresber. 60 (1): 222. 1940; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 532, 587, & 613 (1940) and 60 (2): 29. 1940; Wangerin & Krause in Just, Bot. Jahresber. 60 (1): 454--455 [72--73], 692, & 741. 1941; Snowden, Grass Comm. & Mtn. Veg. Uganda 89. 1953; Lindeman & Gorts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 330--339. 1968; Teunissen & Wildschut, Verh. Konink. Nederl. Akad. Wet. Natuurk. 59 (2): 23, 33, 36, 46, 57, & table 1. 1970; Teunissen & Wildschut, Meded. Bot. Mus. Utr. 341: 23, 33, 36, 46, 57, & table 1. 1971; Araujo, Rev. Bras. Biol. 31: 507--511, fig. 9 & 10. 1971; Löve, Taxon 20: 613. 1971; Pinkava, Biol. Abstr. 54: 75. 1972; Wilbur, Madroffo 21: 543. 1972; Cuf., Bull. Jard. Bot. Nat. Belg. 42 (3): Suppl. [Enum. Pl. Aethiop.] 1624 & 1637. 1972; Moldenke, Phytologia 25: 117--166. 1973.

#### BLASTOCAULON RUPESTRE (G. Gardn.) Ruhl.

Additional bibliography: Moldenke, Phytologia 24: 336 (1972) and 25: 160 & 161. 1973.

#### CARPOTEPALA Moldenke

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 57 (2): 15. 1937; Moldenke, Phytologia 24: 336--337 & 508. 1972.

#### CARPOTEPALA JENMANI (Gleason) Moldenke

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 57 (2): 15. 1937; Moldenke, Phytologia 24: 337. 1972.

#### COMANTHERA L. B. Sm.

Additional bibliography: Uittien & Heyn in Pulle, Fl. Surin. 1 [Meded. Konink. Ver. Ind. Inst. 30, Afd. Handelsmus. 11]: 220 & 223--224. 1938; Lindeman & Gorts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 335. 1968; Moldenke, Phytologia 24: 337 & 508. 1972.

#### COMANTHERA KEGELIANA (Körn.) Moldenke

Additional bibliography: Uittien & Heyn in Pulle, Fl. Surin. 1 [Meded. Konink. Ver. Ind. Inst. 30, Afd. Handelsmus. 11]: 220 & 223--224. 1938; Lindeman & Gorts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 335. 1968; Moldenke, Phytologia 24: 337. 1972.

#### ERIOCAULON Gron.

Additional synonymy: Erocaulon Ohwi, Bot. Mag. Tokyo 45: 196,

sphalm. 1931.

Additional & emended bibliography: Trimen, Syst. Cat. Flow. Pl. Ceylon 99 & 124. 1885; J. L. Bennett, Pl. Rhode Isl. 47. 1888; Hook. f. in Trimen, Handb. Fl. Ceylon 5: [1]--11. 1900; Baerecke, Anal. Key Ferns & Flow. Pl. Atl. Sect. Mid. Fla. 25. 1906; H. Lecomte, Fl. Gén. Indo-chine 7 (1): 1--18. 1912; T. C. E. & R. E. Fries in R. E. Fries, Wiss. Ergebn. Schwed. Rhod.-Kong.-Exped. 1911-12 Bot. 1: 217--219, pl. 16, fig. 1--4. 1916; Fedtsch., Act. Hort. Bot. Petrop. 38: 236. 1924; W. C. Ferguson, Torreya 25: 110. 1925; Ruhl., Notizbl. Bot. Gart. Berlin 10: 1040--1043. 1930; Salomon, Journ. Indian Bot. Soc. 10: 139--144. 1931; Miyabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. 27 [Fl. Hokk. & Saghal. 3]: 286 & 288. 1932; Wangerin in Just, Bot. Jahresber. 58 (1): 609 [39]. 1938; Fedde in Just, Bot. Jahresber. 57 (2): 773. 1938; Uittien & Heyn in Pulle, Fl. Surin. 1 [Meded. Konink. Ver. Ind. Inst. 30, Afd. Handelsmus. 11]: 215--218 & 220--223. 1938; Fedde & Schust. in Just, Bot. Jahresber. 58 (2): 19 (1938) and 59 (2): 19, 20, 213, & 265. 1939; Fedde in Just, Bot. Jahresber. 58 (2): 535. 1939; Lugard, New Bull. Misc. Inf. 1939: 104. 1939; Krause in Just, Bot. Jahresber. 60 (1): 222. 1940; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 532 (1940) and 60 (2): 29. 1940; Wangerin & Krause in Just, Bot. Jahresber. 60 (1): 454--455 [72--73] & 692. 1941; Snowden, Grass Comm. & Mtn. Veg. Uganda 89. 1953; Löve, Taxon 20: 613. 1971; Pinkava, Biol. Abstr. 54: 75. 1972; Wilbur, Madroño 21: 543. 1972; Cuf., Bull. Jard. Bot. Nat. Belg. 42 (3): Suppl. [Enum. Pl. Aethiop.] 1637. 1972; Moldenke, Phytologia 25: 121--128, 135, 152, 154, 155, 159, 160, 162, & 173. 1973.

Thwaites & Hooker (1864) classify this genus in the Restiaceae.

#### ERIOCAULON ABYSSINICUM Hochst.

Additional bibliography: T. C. E. & R. E. Fries in R. E. Fries, Wiss. Ergebn. Schwed. Rhod.-Kong.-Exped. 1911-12 Bot. 1: 218. 1916; Moldenke, Phytologia 24: 339, 350, & 496. 1972.

#### ERIOCAULON ALPESTRE Hook. f. & Thoms.

Additional & emended bibliography: H. Lecomte, Fl. Gén. Indo-chine 7 (1): 2 & 10. 1912; Moldenke, Phytologia 24: 340. 1972.

#### ERIOCAULON ALPINUM Van Royen

Additional bibliography: Moldenke, Phytologia 24: 341. 1972.

Schodde found this plant forming dense circular tussocks about 40 cm. in diameter in alpine bogs at 11,500 feet altitude.

Additional citations: NEW GUINEA: Papua: Schodde 1918 (Ba).

#### ERIOCAULON ANNAMENSE H. Lecomte, Fl. Gén. Indo-chine 7 (1): 5--6. 1912.

Additional & emended bibliography: H. Lecomte, Fl. Gén. Indo-chine 7 (1): 2 & 5--6. 1912; Moldenke, Phytologia 24: 341. 1971.

#### ERIOCAULON AQUATICUM (J. Hill) Druce

Additional & emended bibliography: Körn. in Mart., Fl. Bras.

3 (1): 280, 489, & 502--505. 1863; J. L. Bennett, Fl. Rhode Isl. 47. 1888; W. C. Ferguson, Torreyia 25: 110. 1925; Salomon, Journ. Indian Bot. Soc. 10: 139--144. 1931; Fedde in Just, Bot. Jahresber. 57 (2): 773. 1936; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 213 & 265 (1939) and 59 (2): 532. 1940; Wangerin & Krause in Just, Bot. Jahresber. 60 (1): 455 [73] & 692. 1941; Moldenke, Phytologia 25: 121. 1973.

Salomon (1931) discusses and illustrates the anatomy of the caudex and root of this species.

#### ERIOCAULON ATRATUM Körn.

Additional bibliography: Trimen, Syst. Cat. Flow. Pl. Ceylon 99. 1885; Moldenke, Phytologia 25: 121--122. 1973.

#### ERIOCAULON ATRATUM var. MAJOR Thwaites

Additional bibliography: Trimen, Syst. Cat. Flow. Pl. Ceylon 99. 1885; Moldenke, Phytologia 25: 122. 1973.

#### ERIOCAULON ATRUM Nakai

Additional bibliography: Moldenke, Phytologia 24: 344, 481, & 482 (1972) and 25: 72. 1972.

#### ERIOCAULON AUSTRALE R. Br.

Additional & emended bibliography: H. Lecomte, Fl. Gén. Indochine 7 (1): 2 & 8. 1912; Moldenke, Phytologia 24: 456--457 (1972) and 25: 88. 1972.

Lecomte (1912) cites this species from Annam and Cambodia. Mc Gillivray & Coveny describe it as an herb 80--100 cm. tall and found it growing in a swamp in association with Melaleuca quinque-nervia, Leptospermum juniperinum, Machaerina juncea, Casuarina glauca, Philydrum lanuginosum, Ranunculus inundatus, etc., flowering in July.

Additional citations: AUSTRALIA: New South Wales: McGillivray & Coveny 347 [N. S. W. 112267] (Ba).

#### ERIOCAULON BAURI N. E. Br.

Additional bibliography: Moldenke, Phytologia 24: 345--346. 1972.

The species has been collected in anthesis in December.

Additional citations: SOUTH AFRICA: Transvaal: Van der Merwe 22 (Ba).

#### ERIOCAULON BONGENSE Engl. & Ruhl.

Additional bibliography: Moldenke, Phytologia 24: 346. 1972.

Morton found this plant growing in wet savannas. Material has been misidentified and distributed in herbaria under the designation E. lacteum Rendle.

Additional citations: GHANA: J. K. Morton GC.6272 (Ba).

[to be continued]

MISCELLANEOUS NOTES ON NEOTROPICAL FLORA, III.

by Jose Cuatrecasas  
Department of Botany, Smithsonian Institution  
Washington, D. C.

A few years ago, on the occasion of my treatment of the Astereae of Colombia (Webbia 24: 46, 1969), I re-established the genus Noticastrum DC. Prodr. 5: 279, 1836. This genus, except for Philippi and Remy, had been completely disregarded by the subsequent botanists, who had preferred to treat its species as Aster or as Leucopsis.

Distinctive features of Noticastrum are the 16-26-ribbed, hirsute achenes with an oblong or rather subfusiform outline and a callous, oblique carpophore, the pluriseriate pappus with 3-6 rows of unequal, rather rigid, scabrous setae, the herbaceous habit with a main pivotant root, a short stem frequently stoloniferous, the subrosular basal leaves and the axillary monocephalous or paucicephalous decumbent at base and for the rest ascendent branches. Authentic Aster species have achenes with only 2-5 noticeable nerves. Fig. 1.

Only one species is known to spread throughout the tropical Andean region; the other species, probably about a dozen, are rather subtropical or extratropical, and found scattered from Chile to Argentina, Uruguay, Paraguay, and southern Brazil. A thorough revision of this group is very much needed. In the meantime, it seems advisable to publish the following new combinations for the species involved along with a listing of names already published under this generic concept.

NOTICASTRUM ACUMINATUM (DC.) Cuatr. comb. nov.

Aplopappus? acuminatus D.C. Prodr. 5: 348. 1836.

Haplopappus calendulaceus Griseb. Symb. Arg. 179. 1879.

Leucopsis calendulacea (Griseb.) Baker in Martius Fl. Brasil. 6(3): 9. 1882.

Leucopsis acuminata (DC.) Malme, Ark. Bot. 24A: 43. 1931.

Aster calendulaceus (Griseb.) Kuntze, Rev. Gen. 3(2): 129. 1898. Cabrera, Bol. Soc. Argen. Bot. 8: 27-28, 1959; Fl. Prov. Buenos Aires 6: 78, 1963.

Type: Gaudichaud 1833, Prov. de Rio Grande (Herb. Imperial du Brésil, no. 1041) (P, lectotype).

Material studied: Pedersen 4474, Concepción, Corrientes; Pedersen 16, Mburucuya, Corrientes, Argentina; Herter 89059, Barra, Uruguay (US). Photo F. M. 14875 of Lorentz, Concepción, Uruguay, isotype of Aplopappus calendulaceus in Berlin.

The synonymy of A. acuminatus DC. with H. calendulaceus is based on Cabrera (l.c. 1959).

## NOTICASTRUM ARGENTINENSE (Cabrera) Cuatr. comb. nov.

Aster argentinensis Cabrera, Compuestas Bonaerenses, Rev. Mus. La Plata (N. Ser) Bot. 4: 73. fig. 20. 1941.

Aster marginatus sensu Cabrera in Fl. Prov. Buenos Aires 4: 79, 1963, no HBK.

The fine lanate indumentum at the branches from the bottom up, made by the capillary slender, flexuose, entangled hairs, distinguishes mainly this Argentinian species from N. marginatum. The latter is rather hirsute or villous; it has sometimes a slightly lanate appearance when its hairs on the branches are very abundant, but in this case, the hairs are thick and spreading in their lower portion and only flexuose on the long tips.

Material studied: PE-4368, Uruguay (US); Krapovickas 2926, Tandil, pr. Buenos Aires (US); Pedersen 3870, 1739, Mburucuya, Corrientes, Argentina (US).

## NOTICASTRUM CALVATUM (Baker) Cuatr. comb. nov.

Leucopsis calvata Baker in Martius Fl. Brasil. 6(3): 8. 1882.

Aster calvatus (Baker) Herter, Fl. Urug. Pl. Vasc. 121. 1931. Cabrera, Bol. Soc. Arg. Bot. 8: 28. 1959.

Type: Riedel, Brasil meridional, (K).

Material studied: Brasil: L. B. Smith 6321, Paraná (US); L. B. Smith & R. Klein 10727, 11837, 12085, Santa Catarina (US); Smith, Reitz & Caldato 9602, Parana (US); Swallen 8905, Paraná (US).

## NOTICASTRUM DECUMBENS (Baker) Cuatr. comb. nov.

Aster decumbens Baker in Martius Fl. Brasil. 6(3): 24, pl. 8, fig. 2. 1882. Cabrera, Compuestas Bonaerenses, Rev. Mus. La Plata 4(16): 73. 1941; Bol. Soc. Arg. Bot. 8: 29. 1959; Fl. Prov. Buenos Aires 6: 79. 1963.

Type: Tweedie, B. Aires (K), photo in US.

Material studied: Pedersen 1745, Mburucuya, Corrientes, Argentina (US).

## NOTICASTRUM GNAPHALIOIDES (Baker) Cuatr., comb. nov.

Leucopsis gnaphalioides Baker in Martius Fl. Brasil. 6(3): 5. 1882.

Aster gnaphalioides (Baker) Hassler, Fedde Repert. 18: 26. 1919. Cabrera, Bol. Soc. Arg. Bot. 8: 29-30. 1959.

Leucopsis acuminata Malme, Arkiv Bot. 24A(6): 43. 1932; not Aplopappus acuminatus DC.

Aster Sellowii Hieronymus in schaed. ex Malme loc. cit. as synonym (nomen nudum).

Type: Regnell III-733, Caldas, Minas Gerais, Brasil.

(Lectotypus, US).

Additional material examined: Brasil: Paraná: Dusen 7968, 9812, 14845 (US); São Paulo: Hoehne 104, 6282, 16480, 16482, 16484 (US); Rio Grande do Sul, Rau s. n. (US).

NOTICASTRUM MACROCEPHALUM (Baker) Cuatr. comb. nov.

Leucopsis macrocephala Baker in Martius Fl. Brasil. 6(3): 8. 1882.

Aster macrocephalus (Baker) Hassler, Fedde Repert. 16: 26. 1919.

Type: Balansa 886, Paraguay (K).

Material studied: Hassler 8914a, Caaguazú, Paraguay (US); Jorgensen 4816, Estancia Rivera, Paraguay (US); Pedersen 2654, Estancia Santa Teresa, Mburucuya, Corrientes, Argentina (US).

The rays in this species may be white, roseate or purple.

NOTICASTRUM MONTEVIDENSE (Sprengel) Cuatr. comb. nov.

Onoseris montevidensis Spreng., Syst. Veg. 3: 502. 1826.

Erigeron diffusus Persoon, Syn. Pl. 2: 431. 1807, not E. diffusus Ait.

Aplopappus? diffusus (Pers.) DC. Prodr. 5: 349. 1836.

Aster montevidensis (Spreng.) Griseb. Fl. Lorentz. 124. 1874. Cabrera, Bol. Soc. Arg. Bot. 8: 31. 1959; Fl. Prov. Buenos Aires 6: 80. 1963.

Leucopsis diffusa (Pers.) Baker in Mart. Fl. Brasil. 6(3): 8. 1882.

Type: Sellow, "Monte Video," Uruguay.

Material studied: Abbiati 4036, Sierra Olabarria, Prov. B. Aires (US); Abbiati 4313, Sierras del Tandil, Prov. B. Aires (US); Pedersen 3822, Mercedes, Corrientes, Argentina (US); Kuntze, Córdoba, Argentina; Swallen 9058, Bage, Rio Grande do Sul, Brasil (US); Sellow 219, Brasil (US).

NOTICASTRUM PSAMMOPHILUM (Klatt) Cuatr. comb. nov.

Aster psammophilus Klatt, Arb. Bot. Mus. Hamb. 1890 extr. 4; Jahrb. Hamb. Wiss. Anstalt 9: 126. 1892.

Type: Ule 1595, Santa Catarina, in Dunen bei Laguna, April 1890 (HBG).

Material studied: Reitz & Klein 642, Campo Massiambu, restinga, 2 m alt, Santa Catarina, Brasil (US).

NOTICASTRUM ADSCENDENS DC. Prodr. 5: 279. 1836. Type of genus Noticastrum.

Type: Gay s. n., Chile, K, lectotype (Herbarium

Hookerianum).

NOTICASTRUM ALBUM Philippi, An. Univ. Chile, 27: 317. 1865.

Type: Philippi, Concepción, Chile (Isotypus, US). Photo of isotype in Berlin FM-14871.

NOTICASTRUM ANTUCENSE Philippi, Linnaea 80: 192. 1858.

Type: Gay 753, Antuco, Chile.

No material attributable to this concept has been seen. Probably it is a synonym of N. marginatum.

NOTICASTRUM ERECTUM Remy in Gay Fl. Chile 3: 338. 1902.

A synonym of N. marginatum. See Cuatrecasas, Webbia 24: 47. 1969.

NOTICASTRUM ERIOPHORUM Remy in Gay Fl. Chile 4: 20. 1849.

Aster eriophorus (Remy) Reiche, Fl. Chile 3: 339. 1902.

In the original description no mention is made of any collection. "Se cria en los cerros de Yaquil en la provincia de Colchagua. Florece en abril." It is probably a synonym of N. haplopappum and N. sericeum.

NOTICASTRUM GLANDULOSUM Philippi, Anal. Univ. Chile 87: 409. 1894.

No authentic material seen of this species. According to Reiche (Fl. 5: 340), it is synonymous with N. adscendens DC.

NOTICASTRUM LEUCOPAPPUM Philippi, Anal. Univ. Chile 87: 408. 1894.

Type: Philippi: Angol (Malleco), Chile.

It is probably a form of N. album, more densely woolly with shorter leaves.

NOTICASTRUM MARGINATUM (HBK) Cuatr., Webbia 24: 47. figs. 2 bis G, 11, 12. 1969.

Aster marginatus HBK., Nov. Gen. Sp. Pl. 4: 91. 1820.

Type: Humboldt & Bonpland s. n. (holotype, P), photo F.M.-37623, Bogota, Colombia.

For description, distribution, synonyms and other data see Cuatrecasas, l. c.

NOTICASTRUM MARGINATUM fma. ACAULIS (Wedd.) Cuatr. comb. nov.

Aster acaulis Wedd., Chl. And. 1: 189, pl. 33A. 1857.

Type: Weddell s. n., Prov. Ayopaya, Bolivia; holotype, P.

There is only extant one rosette of this collection and it matches well Gay's Cuzco collection mentioned below.

Other collections examined: Gay 462 (P, paratype), Dept. Cuzco, Peru; Mandon 214 (P), vicinity Sorata, Bolivia, via ad Lacatia, reg. alp. 3700 m, Oct. 1858.

NOTICASTRUM PHILIPPI Sch. Bip. Bonplandia 4: 54. 1856. Nomen nudum.

A synonym of N. marginatum. See Cuatrecasas, Webbia 24: 47. 1969.

NOTICASTRUM PRADENSE (Philippi) Philippi, Linnaea 33: 130. 1864.

Aster pradensis Philippi, Linnaea 28: 729. 1857.

Type: Philippi s. n., Cuesta del Prado (Valparaiso-Santiago) et Talcahuano, Chile.

Probably, it is synonymous with N. sericeum Less.

NOTICASTRUM SANFURGI Philippi, An. Univ. Chile 87: 409. 1894.

I have seen no material of this species. According to Reiche (Fl. Chile 3: 340), it is a synonym of N. adscendens.

NOTICASTRUM SERICEUM (Lessing) Lessing ex Philippi Linnaea 33: 130 (1864-65).

Diplopappus sericeus Less. Linnaea 6: 110. 1831.

Aplopappus? sericeus (Less.) DC. Prodr. 5: 349. 1836.

Noticastrum haplopappum Remy in Gay, Fl. Chile 4: 19. 1849.

Aster notosericeus Griseb. Symb. 178. 1879.

Leucopsis sericea (Less.) Baker in Martius Fl. Brasil.

6(3): 7. 1882.

Aster haplopappus (Remy) Kuntze, Rev. Gen. 1: 316. 1891.

Cabrera, Compuestas Bonaerenses, Rev. Mus. La Plata 4(16): 78.

1941; Fl. Prov. Buenos Aires 6: 82. 1963.

Type: Chamisso, Talcahuano, Concepción, Chile.

Material seen: Philippi s. n., Maule, Chile (US); Job 206, Chafari, Entre Rios, Argentina (US); Kuntze, Villa Mercedes, Argentina (US); Lillo 82990, Quitilipi, Chaco (US);

Ibarrola 2314, Juan Pujol, Corrientes, Argentina (US).

#### Acknowledgement

This paper is extracted from studies supported in part by the National Science Foundation, Washington, D. C. .

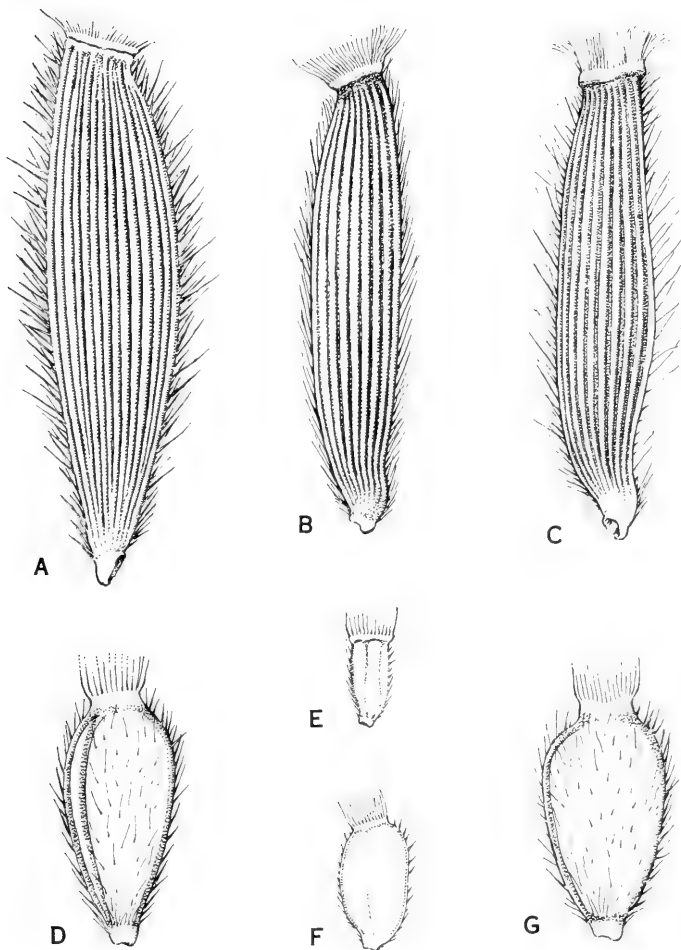


Fig. 1. - A, Noticastrum calvatum (L.B. Smith 6321); B, Noticastrum adscendens D.C., from type specimen, Gay s.n. (K); C, Noticastrum marginatum (Archer 1220); D, Aster amellus L. (Herb. Mouillefarine), 3-ribbed form; E and F, Aster dumosus L. (Cuatr. s.n.); G, Aster amellus (Herb. Mouillefarine), simply marginate (2-ribbed) form. All x 10.



HERB. MUS. PARIS

*Notocaulum*  
*adscendens* DC.

Chile. cl. Fay

*Notocaulum adscendens* DC.  
Type *genuina*  
5-18-1963

HERB. MUS. PARIS

*Notocaulum adscendens* DC.



CHILI.

W. Cl. Gay

STUDIES IN COURSETIA (LEGUMINOSAE). I.

Velva E. Rudd, Smithsonian Institution

While checking a specimen recently sent for determination the following two species were noted as worthy of recognition. They appear to be related to Coursetia mollis Robinson & Greenman (Proc. Am. Acad. 29: 384. 1894), non C. mollis (H.B.K.) Macbride (Field. Mus. Pub. Bot. 13 (3): 390. 1943) as "C. mollis (Benth. & Oerst.) Macbr."

COURSETIA GUATEMALENSIS Rudd, sp. nov.

Frutex, C. molli Robinson & Greenman affinis sed foliolis plerumque paucioribus, minoribus, aristulatis, inflorescentiis spicatis, floribus minoribus, numerosioribus, fructibus glabrescentibus differt.

Shrub, to about 3 m. tall; stems tomentulose, glabrescent; leaves paripinnate or imparipinnate, 9-14-foliolate, the axis about 4-9 cm. long, pilose or tomentulose; stipules subulate, subspinescent, about 3-8 mm. long, 0.2 mm. wide at the base, pilose, glabrescent; stipels subulate, 2 mm. long, caducous; leaflets elliptic to elliptic-ovate, (0.5-) 1.5-4 cm. long, (0.3-) 0.5-1.5 cm. wide, acute, aristulate, the base rounded to cuneate, the upper surface puberulent but essentially glabrous at maturity, the lower surface moderately to densely sericeous; inflorescences villous, spicate, many-flowered, the pedicels about 1 mm. long or less; bracts subulate, 3-5 mm. long, 1 mm. wide at the base or less; flowers 7.5-8 mm. long; calyx villous, 4-4.5 mm. long, the tube 1.5-2 mm. long, the teeth subulate, 2.5-3 mm. long; petals glabrous, the vexillum dark red, the keel and wings pale yellow or greenish; stamens diadelphous 9:1 with the vexillar filament separate to the base; fruit linear, compressed, 2-valved, dehiscent, somewhat torulose, more deeply compressed between the seeds but not septate, 3.5-5 cm. long, 4-5 mm. wide, sessile, about 8-seeded, puberulent, usually glabrate at maturity; seeds dark brown, smooth, suborbicular, compressed, 3 mm. long, 2 mm. wide, 1 mm. thick, the hilum apical, 0.3 mm. in diameter.

Type: P. C. Standley 60354, Guatemala, Sacatepequez, near Antigua, dry brushy hillside, alt. 1500-1600 m., Nov. 1938-Feb. 1939 (holotype US no. 1970655; isotype F). Paratype: A. Molina R. 21381, Guatemala, Huehuetenango, cliff of Río Selegua, 47 km. from Huehuetenango, between Puente Cuevas and Los Monos, road to La Mesilla, alt. 1400 m., Nov. 20, 1967 (F).

COURSETIA HINTONII Rudd, sp. nov.

Frutex, C. molli Robinson & Greenman affinis sed foliolis paucioribus, aristulatis, spinis stipulis longioribus argutioribus, fructibus angustatioribus, minus pubescentibus differt.

Shrub, to about 3 m. tall; stems puberulent and pilose with multicellular, capitate, glandular hairs; leaves imparipinnate, 13-19-foliolate, the axis 2-10 cm. long, glandular-pilose; stipules subulate, spinescent, 5-13 mm. long, 1-1.5 mm. wide at the base, puberulent and glandular-pilose, glabrescent; stipels apparently lacking; leaflets elliptic, 0.5-2 cm. long, 0.3-0.8 cm. wide, obtuse to acute, aristulate, the base rounded to cuneate, the upper surface puberulent to subsericeous, the lower surface sericeous or subsericeous, the veinlets drying dark-reddish; inflorescences puberulent and glandular-pubescent, racemose, many-flowered, the pedicels 3-7 mm. long; bracts subulate to lanceolate, 2-6 mm. long, to about 1.5 mm. wide at the base; flowers 15-17 mm. long; calyx glandular-pubescent, about 10 mm. long, the tube about 3 mm. long, the teeth subulate, 6-7 mm. long; petals greenish, drying with reddish or purplish stripes, the vexillum puberulent on the outer face; stamens diadelphous 9:1 with the vexillar filament separate to the base; fruit linear, compressed, 2-valved, dehiscent, torulose, more deeply compressed between the seeds but not septate, about 12-15-seeded, 7-8.5 cm. long, 5 mm. wide, sessile, moderately puberulent and glandular-pilose; seeds light brown or chestnut, suborbicular, compressed, 3-3.5 mm. in diameter, 1 mm. thick, the hilum orbicular, 0.5 mm. in diameter.

Type G. B. Hinton 7051, México, México, Temascaltepec, Palmar, hill, November 27, 1934 (holotype US no. 1636808). Paratypes: G. B. Hinton 2983, Mexico, México, Temascaltepec, Plaza de Gallos, alt. 1200 m., December 20, 1932 (US); B. E. Reko 5015, México, Guerrero, Achotla, alt. 900 m., October 1926 (US).

Another species to be assigned to Coursetia is Pictetia microphylla Benthham ex Hemsley. Examination of the syntypes at Kew has shown them to be referable to C. glandulosa A. Gray, as cited below:

COURSETIA GLANDULOSA A. Gray, Proc. Am. Acad. 5: 156. 1861.

Type: L. J. Xantus 25, México, Baja California del Sur, "Cape St. Lucas, &c., Lower California", August 1859 - January 1860 (holotype GH; isotype US).

Pictetia microphylla Benthham ex Hemsley, Diagn. Pl. Nov. 8.

1878. Type: T. Coulter s. n., "México: Sonora Alta" (lectotype K). Syntype: "Parkinson, sine habitatione" (K).

Coursetia microphylla A. Gray, Proc. Am. Acad. 17: 201. 1882.

Type: C. G. Pringle s. n., Arizona, "rocky canyons of the Santa Catalina Mts.", April 14, 1881 (lectotype GH; isotype US); syntype: Mr. & Mrs. J. G. Lemmon (GH).

## TRIBAL REVISIONS IN THE ASTERACEAE. II.

### THE RELATIONSHIP OF TRICHOSPIRA.

H. Robinson and R. D. Brettell  
Smithsonian Institution, Washington, D.C. 20560.

The genus Trichospira has been placed in various sections of the Asteraceae during the years since it was described. Kunth (1818) originally described the genus and included it with Lagascea, Elephanthopus, Rolandra and Spiracantha in a section Carduaceae subsection Echinopsidae. The subsection immediately preceded Kunth's subsection Vernoniaceae. Cassini (1819) extensively reviewed the work of Kunth placing most of the Echinopsidae including Trichospira in the new tribe Vernonieae while placing Lagascea in the Heliantheae. Cassini emphasized the structure of the style as a basis for his tribe. Bentham (1873) seemed to think the genus had more Helianthian characters than Vernonian and he transferred the species listing it near Synedrella. Hoffman (1894) followed the system of Bentham placing the genus in the Coreopsinae, but he also mentioned Trichospira in the key to the Vernonieae. Though it was not stated, the assignment of Trichospira to the Heliantheae and especially to the Coreopsinae seems to be based on the strongly bicornute form of the achene. All recent treatments have followed Hoffman.

A recent survey of the microscopic features of the genera of the Helianthieae has caused the authors to reconsider the position of Trichospira. A broad spectrum of structures has been studied with some difficulties encountered because of the very reduced size of the flowers and particularly the anthers. Trichospira is found to be clearly a member of the Vernonieae in spite of the exceptional achene and the genus does not conform to the natural limits we recognize for the Coreopsinae.

The case for the Vernonieae includes the structures of the following parts:

Leaves: The alternate insertion of the leaves is particularly marked in the two tribes Vernonieae and Inuleae. Such alternate leaves are also a marked feature of Trichospira. The unusual feature of the latter genus is the seemingly opposite position of the leaves in the inflorescence of the plant, an unusual type of modification, at best, since the reverse type of change is the only one noted in most composites. Close examination shows that the leaves of the inflorescence in Trichospira are not truly opposite but become subopposite by alternating short internodes.

**Corollas:** The shape of the corolla with its deeply cut narrow lobes is characteristic of the Vernoniaeae. The lobes reach an extreme form rarely approached and not equalled in the Heliantheae.

**Anthers:** In structure the anthers show the greatest concentration of critical characters. The bases, in their reduced form show some variation, but are generally much extended and untailed as in other Vernoniaeae. The exothecial cells are subquadrate as is common in both tribes but the thickenings are weak and curved and distributed toward both transverse and longitudinal walls as in the Vernoniaeae. The anther appendage is flat and shows none of the concave structure seen in all Heliantheae.

**Pollen:** The Vernoniaeae have shown a consistent form of pollen bearing connecting ridges while the pollen in the Heliantheae bears separated spines. The pollen of Trichospira is difficult to see because of thin walls that collapse easily, but initial impressions have been confirmed by use of the Scanning Electron Microscope. The pollen has the spines connected by ridges.

**Styles:** The style is totally characteristic of the Vernoniaeae with the slender tapering branches bearing stigmatic surfaces on the inner side. The hairs are prominent on the backs of the branches and are continued below the bases of the branches similarly to other Vernoniaeae but unlike any Heliantheae with which the genus has ever been compared.

The only feature on which relationship with the Heliantheae might be based is the structure of the achene. This last is flattened and strongly biaristate or bicornute depending on interpretation. Superficial resemblance to various members of the Coreopsinae is marked but it might be noted that the retrorse setae found in many Coreopsinae are not found in Trichospira. The wall structure of the achene seems rather unique in both the Heliantheae and the Vernoniaeae having small firm-walled cells lacking raphides and bearing small spines. Such achene walls are not seen in any Coreopsinae but have not been seen in other Vernoniaeae either. The illustration of Oiospermum involucreatum Lessing in the Flora Brasiliensis treatment of the Vernoniaeae (Baker 1873) suggests a similar wall structure to that of Trichospira but no specimens of Oiospermum have been seen.

Further indication that Trichospira is not a member of the Coreopsinae can be obtained by a closer analysis of the latter group. As recognized by Hoffman the Coreopsinae do seem to contain a very natural main element with a few very unrelated genera appended. The true Coreopsinae can be defined by (1) the lack of the common form of sharp tipped Helianthian hairs

on the corolla or achene (2) the lack of any glands or hairs on the anther appendage or connective and (3) by the usual presence of a prominent laticifer extending upward in the anther reaching into the appendage. The latter character is unfortunately not found in absolutely all Coreopsinae but is often very noticeable when containing dark yellowish or reddish latex. By this delimitation Guizotia having "Helianthian hairs" on the corollas and glands on the anther appendages, and the related pair Synedrella and Calypocarpus having a few helianthian hairs on the corolla or achene would be transferred from the Coreopsinae to the Verbesinae in the Heliantheae.

The study indicates that flattened bicornute achenes have developed independently in at least three groups of the composites, one of these being the Vernoniaceae.

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## BOOK REVIEWS

Aima L. Moldenke

"LEAVES FROM GERARD'S HERBALL — Arranged for Garden Lovers" by Marcus Woodward, xii & 305 pp., illus., Dover Publications, Inc. Facsimile, New York, N. Y. 10014. 1969. \$2.50 paperback.

This is an unabridged replication of the 1731 edition which is an emended seasonal arrangement with 130 of the original illustrations of "The Herball or General Historie of Plantes" by John Gerard with editions in 1597, 1633 and 1636. It makes delightful reading for those who would appreciate a nodding acquaintance with this famous work.

How could one go wrong at such a price?

"MONOGRAPHIE DER FAMILIE PLATYPODIDAE, COLEOPTERA" by Karl E. Schedl, v & 322 pp., illus., Dr. W. Junk N.V., Publishers, The Hague, Netherlands. 1972. Dutch Guilders 70 or \$22.00.

Over a half century of study by this author who has accumulated the largest collection of the platypod wood-boring beetles is the background of this very carefully prepared text. The only other previously published comprehensive works are dated 1866 and 1914; so this one is certainly needed now.

The work covers the anatomy and physiology of the different life stages, the biology of the metamorphic stages, fungi in their chambers, population dynamics, fossil history, phylogeny, geographic distribution and detailed systematics with keys and specimen citations. All is carefully illustrated and indexed. There are 451 American species with 91 of these from Brazil, 660 southeast Asian and Pacific species with 123 of these from New Guinea and 124 from Malaya, and 813 African species with 189 from the Congo. They seem to favor for food and breeding shelter the trunks of Sterculiaceae, Dipterocarpaceae, Combretaceae, Lauraceae, Rubiaceae, Theaceae and Pinaceae. Botanists will wish that the author had included the plant species used by the specific insects because he would surely know. These beetles are of great importance economically.

"INSECTS" Volumes I and II by David Sharp, Vol. I xii & 584 pp., illus., Vol. II xii & 626 pp., illus., Dover Publications, Inc. Facsimile, New York, N. Y. 10014. 1970. \$4.50 each vol., paperback.

This work is an unaltered replication of the second printing in 1901 of the original published in 1895 as Volume V of the Cambridge

Natural History Series: "Peripatus, Myriapods, Insects". It has long since become a classic, and so it is welcomed in this now easily available form.

Since this work is mainly (and carefully) descriptive it is still valid today. Its illustrations are very clear. For the amateur, as well as the serious student and functioning entomologist, biologists and naturalists generally, this is a storehouse of valuable information on all the important insect forms of the world presented in lucid, interesting style.

"METHODS FOR RESEARCH ON THE ECOLOGY OF SOIL-BORNE PLANT PATHOGENS" by Leander F. Johnson & Elroy A. Curl, viii & 247 pp., illus., Burgess Publishing Co., Minneapolis, Minnesota 55415. 1972. \$14.95.

"This compilation is designed primarily to be used as a laboratory manual by professional scientists and students engaged in research on soil-borne plant diseases. It can be used also as a reference manual for specialized courses in plant pathology, soil microbiology, and microbial ecology." Some of the still useful techniques developed in "Methods for Studying Soil Microflora-Plant Disease Relationships" by these authors along with Bond and Fribourg in 1959 are included in this new work. Of course, new and improved techniques are also included.

The sixteen chapters cover such topics as collection of soil samples, isolation of different types of organisms from soil and in cultures, observations in situ, microorganisms in the rhizosphere, root exudates, antagonisms, antibiosis, biological controls, and culture media.

"GENETIC VULNERABILITY OF MAJOR CROPS" by the Committee on Genetic Vulnerability of Major Crops National Research Council, vii & 307 pp., illus., National Academy of Sciences, Washington, D. C. 20418. 1972. \$7.95 paperback.

Aroused by the considerable food loss due to the fungal southern corn leaf blight (maize varieties with T cytoplasm in the bulk of American acreage are highly susceptible to Helminthosporium maydis) in 1970, this group of scientists set about studying the cause-effect relationships that are recorded in this important study. The subject is treated in three parts — general considerations of epidemics, vulnerability of individual crops (corn, wheat, sorghum, pearl millet, rice, potato, sugar beet, sweet potato, soybean, other legumes, other vegetables, cotton), and the challenges of genetic vulnerability.

"Two points are clear: (a) vulnerability stems from genetic uniformity, and (b) some American crops are on this basis highly vulnerable.....If uniformity be the crux of genetic vulnerability, then diversity is the best insurance against it.

"Man generates his own epidemics because he carries the parasites along with him.

"The committee suggests the establishment of a national monitoring committee to keep a watchful eye on the development and production of major crops and to remain alert to potential hazards associated with new or widespread agricultural policies."

Fortunately, the text is written directly and clearly which should result in it being willingly and comprehensively read by our political leaders and others than just the scientific community.

"PLANT LIFE THROUGH THE AGES — A Geological and Botanical Retrospect" by A. C. Seward, xvi & 603 pp., illus., Hafner Publishing Company, London & New York, N. Y. 10003. Facsimile publication 1966. \$14.95.

This replication of the second edition of 1933 of this still highly valuable study has made and is making it more accessible on more library shelves.

"COLLEGIATE DICTIONARY OF BOTANY" by Delbert Swartz, iv & 520 pp., Ronald Press Company, New York, N. Y. 10016. 1971. \$10.50.

This work is a companion volume to the "Collegiate Dictionary of Zoology" by Robert Pennak which appeared a few years ago and seems to be much used. This work will probably prove equally useful to students and workers in the whole field of botany

The present work started over thirty years ago, growing from a card file into the first draft of the manuscript when the author died. His wife completed the task which now includes almost 24,000 entries.

The definitions have the advantage of being short, uninvolved and clear. The second definition given for compound flower is unusual. For Funkia no reference is given to Hosta. An appendix outlines the Plant Kingdom in which the mycologist-author still considers fungi as plants. The names Eumycophyta and Fouquieriaceae are misspelled and the order Polemoniales is made equivalent to the Tubiflorae covering 22 families from the Convolvulaceae through the Phrymaceae.

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7



NOVITATES ANTILLANAE. VI (1)

Alain H. Liogier

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Universidad Nacional Pedro Henriquez Urefia, Santo Domingo  
Dominican Republic.

The accumulation of critical specimens collected in the field in the Dominican Republic has led to the study of the recently made collections, with the help of the large herbaria and libraries. While spending some time at the New York Botanical Garden, I had the opportunity to study several of these specimens, and among them were some species unknown to science, and also some new records for the island of Hispaniola. This paper deals with most of the critical material, but there are still a few undescribed plants that need further study, and it is my hope that this can be done in the future. This series of papers is in direct preparation to the writing of a Flora of Hispaniola, which will probably begin soon. Some field work is still needed to complete collections, especially in several places that were little collected to the present.

GRAMINEAE

LEPTOTHRIUM RIGIDUM Kunth, Rev. Gram. 1: 156. 1829.

Dominican Republic: along the beach, S-E of Cabo Rojo, Pedernales, Alain Liogier 13897 (NY).

This collection agrees perfectly with the Jamaican plants at the New York Botanical Garden. First record for Hispaniola.

ORCHIDACEAE

BASIPHYLLAEA ANGUSTIFOLIA Schltr., Fedde, Rep. Spec. Nov.  
21: 338. 1925.

Dominican Republic: On lateritic soil, Loma Peguera, Bonao, alt. 300-400 m, Alain Liogier 17356 (NY).

BASIPHYLLAEA SARCOPHYLLA (Rchb.f.) Schltr. Fedde, Rep. Spec.  
Nov. 17: 78. 1921.

Dominican Republic: Monte Negro, from Sánchez to Las Terreras, Samaná Peninsula, alt 300-400 m, Alain Liogier 14459 (NY), det. L. Garay.

The genus Basiphyllaea Schlcht. comprises few species from the West Indies and Florida. Our two new records were previously known only from Cuba, to which both were considered endemics; B. angustifolia has also been reported from Puerto Rico by D. Dod, though I have seen no specimens.

PSEUDOCENTRUM MINUS Benth. in Hook. Ic. Pl. 14. 64, t.1382.  
1882.

Dominican Republic: In woods, on slopes, Sierra de Neiba Hondo Valle, alt 1000 m, Alain H. Liogier 17805 (NY), collected by Donald Dod.

(1) Research supported by funds from the National Science Foundation under Grant GB-17518.

Another new record for Hispaniola; the plant was previously known from Jamaica.

LEGUMINOSAE-PAPILIONOIDEAE.

MACROPTILIMUM ATROPURPUREUM (DC.) Urb., Symb. Ant. 9: 457. 1928.  
Phaseolus atropurpureus DC. Prodr. 2: 395. 1825.

Dominican Republic: On roadside, Sabaneta de Yásica, Puerto Plata, about sea level, Alain Liogier 17874 (NY).

This plant is introduced into the Dominican Republic as a forage plant, and has become an escape in some places. The local name is KUDZU, and it has been introduced as SIRATRO.

MALPIGHIACEAE.

STIGMAPHYLLON MICROPHYLLUM Griseb. Mem. Am. Acad. n.s. 8: 168. 1860.

Dominican Republic: In thickets, near Sabana Buey, Baní, alt 150 m, Alain Liogier 18094. (NY).

A new record for Hispaniola. This species is distinguished by its small membranous leaves, and by the dilated tip of the posterior styles.

EUPHORBIACEAE.

EUPHORBIA LANCEFOLIA Schlecht. Linnaea 7: 143. 1832.

Dominican Republic: Among coffee plantations, Jamao, Moca, Alain Liogier 18276 (NY).

This Central American plant is probably introduced as a weed with the coffee seeds. I had the opportunity to report the same introduction in the mountains of Western Cuba in Flora de Cuba 3: 131. 1953.

VITACEAE.

CISSUS GRISEBACHII Planch. in DC. Mon. Phan. 5: 541. 1887.

Dominican Republic: In cloud forest, Alto Casabito, Bonao, alt. 1000 m, Alain Liogier 17483 (NY).

This new record for Hispaniola matches the Cuban specimens in the Herbarium. The stems are strongly verrucose, the leaves rhombic-obovate, the inflorescence densely pubescent.

THEACEAE

TERNSTROEMIA GLANDULOSA Alain, sp. nov.

Frutex 2.5-3 m altus; rami cortice griseo ad apicem bene foliati; petioli usque 2 mm longi, 1.5 mm crassi; folia elliptica vel obovata, 2-3.5 cm longa, 1.5-2.2 cm lata, apice rotundata vel emarginata, basi acuta in petiolum angustata, margine recurvo glandulis nigris punctata, nervo medio supra obsoleto vel vix impresso, subtus prominulo ad basim crassiore, nervis lateralibus utroque nullis, brunnea, subtus pallidiora,

laevia. Flores solitarii, pedunculi 2.5-3 cm longi, gracili; bracteolae late ovatae 2 mm longae et latae, apice mucronatae, margine glandulosae dorse carinatae, sepala coriacea, exteriora ovata 5 mm longa apice acuta basi sub-auriculata margine glandulosa, sepala interiora ovata 5 mm longa, apice acutiuscula, margine eglandulosa, omnia mucronulata; petala flava, acuta, 3 mm longa, 3 mm lata basi connata; stamina numerosa basi corollae adnata, filamenta breviter incrassata, antherae subulatae 1.5 mm longae; styli 2 usque ad basin liberi, oblongi, 1 mm longi 0.6 mm lati, apice rotundati; ovarium 2-loculare. Fructus ignotus.

Dominican Republic: On limestone rocks, Hoyo de Pelempito, Pedernales, alt 1100 m, 26 Feb 1971, Alain H. Liogier 17923 (Typus: NY); id. Alain Liogier 13873 (NY).

By its conspicuous glands on the leaf margins, this species should be placed near T. nashii Urb., which has long bracteoles; the inner sepals in T. glandulosa lack the glands. Another closely related species is T. selleana Ekm. & Schm., with very small calyx lobes (2-2.5 mm long), and very short bracteoles (1.5 mm long), which are not keeled.

#### MYRTACEAE

EUGENIA CHACUEYANA Alain, sp. nov.

Frutex 3-4 m altus, rami hornotini plus minus compressi pilosuli, vetustiores grisei cortice fissi; petioli 1-2 mm longi glabri supra leviter sulcati; folia elliptica vel ovato-elliptica, 1-2 cm longa 6-12 mm lata, apice obtusa vel acuta et breviter acuminata, basi obtusa vel rotundata, vel subemarginata, nervo medio supra impresso, subtus prominente, lateribus utrinque nullis, punctis glandulosis supra nullis, subtus prominulis, margine paullo incrassato recurvo subcoriacea. Pedunculi axillares 6-10 mm longi, bracteolae minutae, ovatae 0.6 mm longae; calycis lobi 4, concavi, inaequales, orbiculares, majores 1 mm longi et lati, minores 0.7 mm longi et lati, margine minute ciliati; petala alba, oblonga, glandulosa 2 mm longa, 1.2 mm lata; fructus non visus.

Dominican Republic: Along a stream at the base of Cerro de Chacuey, Partido, Dajabón, alt 150 m, 22 Oct 1969, Alain H. Liogier 16462 (Typus: NY).

This species is similar to E. formonensis Urb., which has leaves with a crenulated margin, and glandular dots above, the peduncle much shorter; the larger calyx lobes ovate, 2 mm long, the smaller lobes triangular, 1.5 mm long, not concave.

*EUGENIA PUBICALYX* Alain, sp. nov.

Frutex parvus 75 cm altus; ramuli compressi pilosuli; petioli teretes 2 mm longi brunnei; folia ovato-lanceolata, apice acuminata basi cordata, 4-5.5 cm longa, 1-3 cm lata, nervo medio supra valde impresso, subtus prominente, lateralibus supra obsoletis vel utroque latere 6-8 prominulis et reticulato-conjunctis; subtus bene prominulis et venis reticulatis conjunctis, glandulis supra nullis subtus sparsis brunneis, margine paullo recurva, glabra, subtus pallidiora. Flores in axillis glomerati, pedicelli 1.5 mm longi, pubescentes, bracteolae triangulares 0.5 mm longae; calycis tubus campanulatus 1.7 mm longus ad apicem 1.5 mm latus, dense puberulus, lobi 4 ovato-orbiculati, 3 mm longi glandulosi glabri margine parce ciliati; petala alba oblongo-obovata, 3.5 mm longa, glandulosa; caetera ignota.

Dominican Republic: In thickets on hillside, in serpentine barrens, Barrancón, Bonao, alt 200-300 m, 17 Apr 1969, Alain H. Liogier 14836 (Typus: NY).

I have found no similar species in the Caribbean; the peculiar leaf-shape, the pubescent calyx are the most distinguishing characteristics.

*EUGENIA YUNANA* Alain, sp. nov.

Frutex 2.5 m altus gemmae parce pilosellae, caeterum glaber; rami hornotini plus minus compressi glandulosi; petioli usque 2.2 mm longi supra canaliculati, folia elliptica vel obovato-elliptica 3-6 cm longa, 2-4.2 cm lata, apice rotundata vel leviter emarginata, basi obtusa vel rotundata, nervo medio supra praesertim ad basim impresso, apice evanescente, lateralibus numerosis parallelis et reticulato-anastomosantibus, supra prominulis subtus prominentibus, punctis glandulosis supra paullo impressis subtus obscuris prominulis, margine integra leviter recurva, coriacea. Flores pauci terminales; pedunculi 5 mm longi, compressi; pedicelli subnulli vel usque 3 mm longi, compressi; bracteolae minutae triangulares usque 0.5 mm longae; calycis tubus semisphaericus, pilosus, 1 mm longus et latus, lobi 4 late semiorbiculares 1 mm longi 1 mm lati, minute ciliati, glanduloso-punctati; petala alba obovata 7 mm longa 5 mm lata, glandulosa; stamina numerosa, exserta, stylus 4.5 mm longus, fructus oblongus, 7-8 mm longus, 6 mm latus, dense glandulosus, 2-locularis, semina pauca.

Dominican Republic: In woods between Boca de Yuma and Cabo Falso, at sea level, 22 Aug 1968, Alain H. Liogier 12280 (Typus: NY).

This plant has little resemblance to any other species of *Eugenia* in the West Indies; its sessile inflorescence, its elliptic coriaceous leaves, with numerous nearly parallel nerves are the most outstanding characteristics.

*HOTTEA NEIBENSIS* Alain, sp. nov.

Frutex 1.5 m altus, rami hornotini plus minus compressi minutissime pilosuli, petioli 1.5 mm longi; folia elliptica vel ovato-elliptica apice versus angustata, apice ipso rotundata, basi acuta vel obtusa, 1.2-1.7 cm longa, 0.7-1.2 cm lata, nervo medio supra leviter impresso, subtus prominente, lateralibus utroque latere 6-8, utrinque prominulis, 0.5-1 mm ante marginem conjunctis frequenter anastomosantibus, margine plana, punctis glandulosis saepe pellucidis supra non conspicuis subtus prominulis, glabra subcoriacea; pedicelli axillares filiformi 3-5 mm longi, bracteae non visae bracteolae triangulares acutae 0.6-0.7 mm longae; alabastra obovato-globosa glandulosa breviter apiculata; calyx in alabastra clausus deinde in lobulos 2 adaperiens, tubus turbinatus 1 mm longus lobi inaequales 3 mm longi; petala (unicum visum) elliptica 5 mm longa; stamina numerosa. Bacca (in paratype A.H. Liogier 14623) globosa 1.5 cm longa, 1.3 mm lata.

Dominican Republic: In rain forest, Sierra de Neiba, near Hondo Valle, alt 1750-1850 m, 5-7 Sept 1968, Alain R. Liogier 12523 (Typus: NY); 31 March 1969, Alain H. Liogier, J. J. Jiménez & J. Marciano 14623, 14628 (NY).

The genus *Hottea* was described by Urban, one of its main characteristics being the calyx closed in bud, opening by two valves at anthesis.

Its position, according to Rogers McVaugh is not altogether clear, and perhaps this species could help clarify the generic concept. It includes seven species, counting the present one. All are very rare and were collected only once or twice.

The nearest taxon is undoubtedly *H. malangensis* (Urb. & Ekman.) Urb., whose leaves are ovate to ovate-orbicular, rounded at the apex; the berry is obliquely oval, only 8 mm wide.

*PSIDIUM GRACILIPES* Alain, sp. nov.

Frutex 3-5 m altus, glaber, rami hornotini paullo compressi brunnei; petioli 2 mm longi supra canaliculati; folia obovata apice rotundata basi cuneata vel obtusa, 1-1.6 cm longa, 8-11 mm lata, nervo medio supra ad basim leviter impresso, ad apicem evanescente, subtus praesertim ad basim prominulo, lateralibus nullis, margine paullo incrassata, glandulis supra obsoletis subtus crebris prominulis obsita, supra nitida, subtus opaca,

chartacea. Flores in axillis solitarii, pedicelli gracili, 1.3-2.3 cm longi, bracteolae non visae; flores non visi; fructus oblongus 5-6 mm longus, 4 mm diam dense glandulosus; calycis lobi 4, oblongi 1.2 mm longi intus glabri; loculi 4, semina numerosa subtriangularia.

Dominican Republic: In cloud forest, Loma Redonda, Ciénaga de la Culata, Constanza, alt 1700-2000 m, 30 Nov 1969, Alain H. Liogier 17138 (Typus: NY).

This species is characterized both by its small leaves and by its slender peduncle; the nearest species in Hispaniola seems to be P. trilobum Urb. & Ekman.; this species has ovate to ovate-rounded leaves, and a much shorter (3-6 mm long) peduncle.

**PSIDIUM NANNOPHYLLUM** Alain, sp. nov.

Frutex usque 1 m altus procumbens vel erectus, rami hornotini 4-angulati glabri, sparse glandulosi; petioli usque 1 mm longi supra applanata; folia elliptica vel rhombo-elliptica, apice obtusa vel breviter cuspidata, basi rotundata, 4-6 mm longa et lata, nervo medio supra basi ipsa leviter impresso, caetera obsoleto, subtus per totam longitudinem prominulo, lateralibus non obviis, margine paullo incrassata glabra, punctis glandulosis supra parvis subtus crebris, supra nitida subtus opaca, plus minus coriacea. Pedunculi terminales vel axillares solitarii usque 3 mm longi; bracteolae lanceolatae recurvae 0.8 mm longae; alabastra obovoidea 4 mm longa breviter cuspidata omnino clausa; calycis tubus campanulatus, lobi 4 inaequales, intus puberulenti, petala alba ovato-orbiculata 4-5 mm longa intus ad basim pilosula; stamina numerosa; ovarium 2-3-loculare; fructus globosus, 7-8 mm diam, laevis; semina pauca.

Dominican Republic: In pine barrens, Loma Peguera, Bonao, alt 300-400 m, on laterite, 8 Aug 1970, Alain H. Liogier 17378 (Typus: NY).

This stands out among the small-leaved Psidium in having 4-angled branchlets, sessile slightly cuspidate leaves, 1-flowered inflorescence and small fruits.

**PSIDIUM SESSILIFOLIUM** Alain, sp. nov.

Frutex vel arbor parva, usque 5 m alta; rami hornotini compressi glandulosi, vetustiores grisei; folia sessilia vel subsessilia orbicularia subreniformia 4-4.5 cm longa, apice rotundata, subtruncata vel subemarginata, basi cordata, vel subcordata, nervo medio supra ad basim prominente ad apicem evanescente subtus ad basim prominente, lateralibus utroque latere

4-6, 2 mm e margine conjunctis, supra et subtus prominulis, utrinque dense glanduloso-punctata glabra, chartacea, margine plana vel leviter recurva. Inflorescentiae terminales vel axillares, cymosae, pauciflorae; pedunculi usque 4 mm longi, pedicelli 1.2-2 cm longi, ad apicem bracteis 2 linearibus 1.6 mm longis muniti, alabastra pyriformia 6-8 mm longa, antice in juventute aperta; calycis tubus glandulosus, lobi 4, in alabastro latissime rotundati; petala non plane visa. Fructus (in paratypo A. Liogier 16145) globulosus 8 mm diam, calycis lobis coronatus, lobis suborbicularibus 8 mm longis et latis margine excepto glabris; loculi 2, semina 1 vel pauca.

Dominican Republic: On serpentine hill, Arroyo Francés, Puerto Plata, alt 50-100 m, 28-29 Oct 1969, Alain H. Liogier 16557 (Typus: NY); 28 Sept 1969, Alain H. Liogier 16145 (NY); in thickets, along Río de las Caritas, Partido, Dajabón, alt. 120 m, on lateritic soil, 22 Oct 1969, Alain H. Liogier 16473 (NY); in thickets along Maguaca river, Partido, Dajabón, Aug 28, 1971, Alain H. Liogier 17385 (NY). Similar to the preceding, but barren and somewhat different in having larger leaves Alain H. Liogier 15877 (NY), from about 4 miles South of La Vega, on serpentine in pine barrens, alt 200-300 m.

There are few species of Psidium with orbicular leaves! P. amplexicaule Pers., from Puerto Rico and the Lesser Antilles is probably the nearest species; it has orbicular to ovate-orbicular leaves, 4-7 cm long, up to 5 cm wide, with 5-8 pairs of nerves, the glands are not conspicuous on the surface; the flower buds are closed and cuspidate, the bracts are triangular and 1 mm long, the fruit is 2 cm in diam. P. harrisianum Urb. from Jamaica has also larger leaves, the bracts are much smaller, the buds are closed and much smaller than in P. sessilifolium. P. orbifolium Urb. from Cuba has the smallest leaves (3.5 cm in diam), the petiole is well developed (5-6 mm long); unfortunately, the flowers and fruits of this last species are not known.

#### APOCYNACEAE

ASKETANTHERA OBTUSIFOLIA Alain, sp. nov.

Frutex volubilis 4-5 m longus, rami brunnei glabri; novelli sparse patenti-villosi; petioli usque 1 cm longi supra canaliculati glabri; folia elliptica, 4-6 cm longa, 2-3.6 cm lata, apice rotundata vel latissime obtusata, basi obtusa ad acuta, nervo medio supra impresso subtus prominente, lateralibus utroque latere 5-6, ad marginem curvatis, supra leviter impressis, subtus prominulis, venis supra obsoletis, subtus reticulato-conjunctis, lamina glauca, supra viridia subtus pallidiora, margine integra, membranacea. Inflorescentiae pauciflorae, axillares, pedunculi usque 3 cm longi; bractee oblongo-lanceolatae usque 12 mm longae, 4 mm latae; pedicelli usque 2.5 cm longi; calycis lobi subulati 12 mm longi basi 1.5 mm lati, intus ad basim squamu-

las lineares apice truncatis inter sepala gerentes; corolla non visa; follicula (in statu juvenili tantum visa) linearia 4.5 cm longa, 1.5-2 mm lata.

Dominican Republic: In thickets, Hoyo de Pelempito, Baoruco Mts., alt 700 m, 3-8 July 1971, Alain H. Liogier 18124 (Typus NY).

This species stands among the other Hispaniolan species by its smaller measurements; the other species are: Asketanthera dolichopetala (Urb.) Woods., A. picardae (Urb.) Woods. and A. ekmaniana Woods. (= Echites longiflora Ekm. & Helw., 1929, not Desf., 1819). The following key will help to recognize the four species in Hispaniola:

a. Leaves rounded to wide obtuse, 4-6 cm long, glabrous; calyxlobes linear-subulate, 10-12 mm long, 1.5 mm wide at base.

A. obtusifolia.

a. Leaves acuminate, 6-15 cm long, pilose or setulose; calyxlobes mostly longer, 4-8 mm wide at base.

b. Corolla 2-5 cm long; inflorescence 8-20-flowered.

c. Corolla 2-2.5 cm long, the tube somewhat shorter than the calyxlobes, essentially glabrous externally.

A. picardae.

c. Corolla 4-5 cm long, the tube conspicuously longer than the calyxlobes, hispidulous externally.

A. dolichopetala.

b. Corolla 13-16 cm long; inflorescence 2-8-flowered.

A. ekmaniana.

#### BORAGINACEAE.

TOURNEFORTIA PARVIFOLIA Alain, sp. nov.

Volubilis; rami pilis minutis plus minus adpressis obsiti, teretes brunescentes; petioli usque 1 mm longi; foliorum lamina ovata vel elliptica 8-12 mm longa, 4-6 mm lata, apice obtusa vel rotundata, basi rotundata vel subcordata, nervo medio supra impresso subtus prominente, lateralibus nullis, margine recurva, supra laevia, minutissime foveolata, foveolae albae, subtus adpresse sericea alba. Inflorescentiae bis vel ter dichotomae ramis usque 1 cm longis brevissime pilosis, 6-10-floris; flores sessiles viriduli; calycis tubus 0.3 mm longus, lobi oblongi 2 mm longi, obtusi; corollae tubus cylindraceus 1 mm longus adpresse pilosus, lobi anguste lineares 0.6 mm longi; stamina tubo corollino ad medium affixa, filamenta subnulla, antherae triangulari-lanceolatae 0.2 mm longae; fructus albi 4-carpidiati glabri 2 mm diametro.

Dominican Republic: In serpentine barrens, Loma Peguera, Bonao, alt 250 m, 17 Oct 1970, Alain H. Liogier 17608 (Typus:

NY).

This plant is distinguished from T. suffruticosa L. and T. stenophylla Urb. by its short ovate or elliptic leaves, while all other species in the Caribbean have larger and lanceolate to linear leaves; its flowers are smaller than any other species, those of T. volubilis L. being about 4 mm long.

#### LABIATAE.

SALVIA DECUMBENS Alain, sp. nov.

Frutex sarmentosus decumbens, 1.5 m longus; rami juniores teretes pilis minutis multiradiatis albidis obtekti; petioli 1.5-2.5 mm longi, folia ovata vel deltoidea vel elliptica, 5-9 mm longa, 3-7 mm lata, basi rotundata vel truncata, nervo medio supra in sulco prominulo, subtus prominulo, lateralibus utroque latere 2 supra leviter impressis, subtus prominulis, vel omnino nullis, margine integra plana vel paullo recurvata, supra pallide viridia pilis multiradiatis obtecta cum glandulis obscuris intermixta, subtus albida dense pilis multiradiatis flocculosa, glandulis intermixta, chartacea. Inflorescentiae terminales pauciflorae, flores 2-7 patenti pilosi; pedunculi nulli; pedicelli usque 3 mm longi; bracteae oblongae 1 mm longae, deciduae; calyx turbinato-campanulatus 10-12 mm longus pilis glanduliferis patentibus obsitus, postice caeruleus; tubus 13-nervis, labia subaequalia 2.5 mm longa, posticum ovatum 5-nervium, apice acutum, antice profunde bilobum lobis triangularibus sub-cuspidatis 3-nervis; corolla caerulea inferne glabra subtus breviter pilosa 17 mm longa, tubus cylindraceus, antice ventricosus, labium posticum oblongum emarginatum, lateralibus rotundatis; stamina sub ore corollae affixa, filamenta 3 mm longa; stylus 13 mm longus sub apice barbatus, bifidus, ramulo posteriore 2 mm longo, anteriore 1 mm longo. uculae ellipsoideae, pallide brunneae, lineis brunneis obscuris laxe reticulatae, 2.2 mm longae, 1.4 mm latae.

Dominican Republic : On limestone rocks, Hoyo de Pelempito, Baoruco Mts., alt 1000 m, 26 Feb 1971, Alain E. Liogier 17932 (Typus: NY).

By its indument, its sarmentose habit, its flower structure, this species belongs to Epling's section Flocculosae. This section is found on the mainland from Mexico to the Andes; there are already two species described from Hispaniola, both from Haiti; S. incumbens Urb. & Ekm. has stellate hairs, the indument is not white or whitish, the corolla has a different shape, the midlobe of the anterior lip being semiorbicular. S. cognata Urb. & Ekm. is a low shrub, with larger leaves (1-2 cm long),

the calyx is 6-7 mm long, the corolla 14 mm long.

### SOLANACEAE

*CESTRUM ACUTIFOLIUM* Alain, sp. nov.

Frutex 1 m altus, rami pauci cortice brunneo, ramuli dense pilis ramosis obsiti. Petioli 3-6 mm longi, supra canaliculati dense ramoso-pilosi; folia anguste elliptica, apice acuta vel breviter acuminata, basi versus aliquantum angustata, basi ipsa rotundata, 3-9 cm longa, 0.8-3.5 cm lata, nervo medio supra impresso subtus prominente, lateralibus utroque latere 4-6, ad marginem apice versus curvatis, supra impressis, subtus prominentibus, venis paucis, lamina chartacea, supra glabra vel pilis ramosis praesertim ad nervum medium sparse obsita, subtus ad nervos ramoso-pilosa, supra viridia subtus pallida. Inflorescentiae axillares, dense pilis ramosis obsitae, pedunculi usque 2 cm longi; folia floralia minuta usque 1 cm longa et 3 mm lata; superiora linearia usque 6 mm longa; calycis tubus 5 mm longus, 4-5 mm latus, basi acutiusculus, lobi 5, lineari-subulati, usque 7 mm longi, intus glabrescentes; bacca (non omnino evoluta) globosa, olivacea, 4 mm diam.

Dominican Republic: In cloud forest, La Nevera, Valle Nuevo alt 2100 m, 3-5 Apr 1971, Alain H. Liogier 17992 (Typus: NY); id., A. H. Liogier 15491, 18026, 13149.

This plant belongs to the same group as Cestrum virgaurea Urb. & Ekm., from Haiti, having developed calyx-lobes; it differs by the long linear-subulate calyx-lobes, while C. virgaurea has short triangular lobes; the calyx itself is glabrous in this last species; the petiole is longer, the nerves of the leaf are slightly or not at all impressed in C. virgaurea. This last species has been collected only once in Haiti by Ekm.

*CESTRUM ACUTIFOLIUM* var. *GLABRIUS* Alain, var. nov.

A var. acutifolium differt: folia apice rotundata vel breve cuspidata, calyx subglaber.

Dominican Republic: In dense forest, La Descubierta, Constanza, alt 1300-1400 m, 1-2 May 1971, Alain H. Liogier 18026 (Typus: NY).

### BIGNONIACEAE

*TABEBUIA PERPAE* Alain, sp. nov.

Frutex 2.5 m altus, ramosus; rami hornotini dense lepidibus albidis ad centrum nigris obsita, rami vetustiores albo-lepidoti; petioli 2 mm longi subtereti, lepidibus brunneis ornati; folia oblonga, 1.2-3 cm longa, 7-14 mm lata, apice rotundata vel obtusissima, basi obtusa vel acuta, nervo medio supra impresso

subtus prominente, lateralibus utroque latere 5-7, arcuatis et sub margine anastomosantibus, supra leviter impressis, subtus prominulis, margine integra, minute lepidota, coriacea. Inflorescentiae terminales 1-2-florae, pedunculi subnulli vel perbrevis, pedicelli 10-12 mm longi, ad apicem 2-bracteati, bractee lineares 1-5 mm longae; calyx in alabastro clausus, in anthesi usque ad medium bilabiatus, 5 mm longus, lobus anticus breviter 2-, posticus 3-lobulatus; corolla albo-rosea, usque 2.3 cm longa, extus glabra, intus pilosa, tubus infundibuliformis ad apicem 8 mm latus, lobi semi-orbiculares 7-8 mm longi; stylus glaber, 8-10 mm longus. Fructus non visus.

Dominican Republic: On limestone rocks, Catalina Island, at sea level, 2 July 1972, Alain H. Liogier 18669 (Typus: NY); id.. Alain H. Liogier 18671 (NY).

The second specimen, A.H. Liogier 18671 has larger leaves, up to 5 cm long and 2 cm wide.

This species is near to T. lindahlii Urb. & Ekm., and T. densifolia Urb. T. lindahlii has oval to obovate leaves, the mid-nerve is only slightly impressed or prominulous; the calyx is up to 10 mm long, the corolla is up to 4.5 cm long; T. densifolia has narrowly oblong to oblong-lanceolate leaves, obtuse to acute at the apex, the bracts are at the middle of the peduncle.

This species is named after its discoverer, my wife Perfa.

#### GESNERIACEAE

GESNERIA BONAONANA Alain, sp. nov.

Frutex 2-3 m altus, glaber, rami juniores in sicco obscure brunescens leviter resinosi, vetustiores foliorum delapsorum cicatricibus ornata; petioli 5-10 mm longi supra anguste canaliculati; folia oblongo-elliptica ad elliptico-lanceolata, 2.5-4.5 cm longa, 8-17 mm lata, supra medium latissima, apice obtuse acuminata vel rotundata, basim in petiolo angustata, nervo medio supra leviter sulcato, subtus prominente, lateralibus in novellis subtus utroque latere 4-5, laxe reticulato-conjunctis, supra obsoletibus, margine in 1/2 superiore dentata, inferne integra, plus minus recurva, glabra, novelli subtus rubri. Pedunculi usque 2 cm longi, filiformes; bractee filiformes, supra basim sitae vel nullae, usque 2-3 mm longae; calycis tubus turbinatus valde 5-angulatus, 2.5 mm longus, ad apicem 2 mm latus, lobi filiformes, usque 8 mm longi, basim 0.6-1 mm lati glabri; corolla rubra 17-20 cm longa basi cylindrica in 1/3 superiore ampliata, ore leviter obliqua, 5-lobulata, lobi semi-orbiculares, 1-1.5 mm longi et lati, glabra, stamina ad basim corollae adnata, fila-

menta 1.7 cm exserta, antherae subquadratae per paria cohaerentes; staminodium 4 mm longum apice leviter incrassatum; discus cupuliformis 0.5 mm altus; stylus glaber, 3.5 cm longus ut stamina valde exsertus, stigma peltatus not bilobulatus; capsula globoso-turbinata 5 mm longa et lata, 5-costata, super calycem convexa et breve vilosa. Semina non visa.

Dominican Republic: On serpentine in thickets, Loma Peguera Bonao, alt 300-400 m, Aug 8, 1970, Alain H. Liogier 17372 (NY).

This is another species belonging to a group of shrubs with relatively small leaves; the nearest species seems to be G. dolichoostyla Urb., which differs from G. bonaoana by the following characters: the young twigs are pulverulent, the leaves are serrate-dentate nearly to the base, the lateral nerves are more numerous and mostly clearly visible, the peduncle is 2-3 cm long, the bracts 1-1.5 mm long and situated above the middle of the peduncle; the corolla is glandular outside, 2-2.5 cm long, the anthers are free, and the style is hairy. G. mormincola Urb. & Sm. has smaller leaves (1.5-2.5 cm x 0.6-1 cm), with the margin mostly entire; the peduncle has 2 bracteoles in the upper half, the calyx-lobes are grooved inside. G. calcicola Alain lacks the bracts on the peduncle, which is 3-3.5 cm long, the calyx tube is 10-costate. G. saratilis Alain has also shorter leaves (1-2.3 cm long), the peduncles are shorter (1 cm), the corolla is 13 mm long, the filaments are not exserted.

GESNERIA SYLVICOLA Alain, sp. nov.

Arbor parva, 6 m alta; ramuli teretes resinam exsudantes, rami vetustiores glabri cortice striati; petioli usque 2 cm longi, 2-3 mm crassi, superne anguste sulcati; folia anguste elliptica ad oblongo-elliptica, apice obtusa vel rotundata, basi cuneata, 10-15 cm longa, 2.5-3.5 cm lata, nervo medio supra impresso, subtus prominente, lateralibus utroque latere 16-18, superne parce, subtus bene prominulis, margine dentata, glabra, chartacea. Pedunculi in axillis foliorum solitarii in anthesi 12 cm longi, apice 2-3-flori; pedicelli 2-5 mm longi, bracteae lineares 3-4 mm longae; calycis tubus turbinatus 4 mm longus, apice 4 mm latus, lobi 5 triangulares apice obtusi, 4.5 mm longi; corolla brunnea, 2 cm longa, glabra, ventricosa, lobi triangulares acuti 3 mm longi, basi 3.5 mm lati; caetera ignota.

Dominican Republic: In dense forest, La Descubierta, alt 1300 m, May 1-2, 1971, Alain H. Liogier 18024 (Typus: NY).

In cloud forest, Loma de la Sal, Jarabacoa, alt 1300 m, Alain Liogier 11710 (NY); in cloud forest, Cuatro Alas, La Culata, Cons-

tanza, Alain Liogier 13078 (NY).

A. Liogier 11710 has an old capsule with a peduncle 25 cm long, the pedicels are 5-6 mm long, the capsule is turbinate, not costate, minutely verrucose, 12-14 mm long. The leaves are up to 18 cm long.

G. sylvicola is related to G. odontophylla Urb. & Ekm.; the main differences are: for G. odontophylla the size of the plant, of the leaves (8-12 cm long), the shape of the leaves, obovate to wide-ovate, acuminate at the apex, the lateral nerves in 6-pairs, the peduncles only 1.5 cm long.

Another set of specimens coming from the rain forest at Sierra de Neiba are referred to this species, until it is possible to get good flowering and fruiting specimens. They are:

A. Liogier, J. J. Jiménez & E. Marciano 14635 (NY); Jiménez, E. Marciano & A. H. Liogier 5619 (NY); A. H. Liogier 12584 (NY).

#### RUBIACEAE.

CHIONE TETRAMERA Alain, sp. nov.

Arbor usque 10 m alta; rami hornotini minute pilosi, resina non exsudantes; rami grisei striati; petioli 3-4 mm longi supra canaliculati; folia elliptica vel oblonga, apice rotundata vel leviter cuspidata, basi rotundata vel cuneata, 3.5-4.5 cm longa, 1.7-2.5 cm lata, nervo medio supra impresso subtus prominulo, nervis lateralibus utroque latere 2-3, supra impressis subtus nullis, ad marginem versus evanescentes, supra obscure viridia in sicco pallida, laevia, subtus pallide viridia, margine recurvo. Inflorescentiae terminales vel axillares, cymose 3-7-florae, flores fragrantés, pedunculi 3-4 mm longi, bracteae lineares 1.5 mm longae; calycis tubus turbinatus 3 mm longus, lobi 4 semiorbiculares, 1 mm longi et lati; corolla alba 6-7 mm longa, in aestivatione 8 mm lata, lobi 4, orbiculati, 3 mm longi, 4 mm lati, apice rotundati; stamina 4 tubo corollino adnata, exserta, filamenta glabra 5 mm longa. Antherae oblongo-lineares basi usque ad medium fissae 3 mm longae; stylus glaber 6 mm longus, apice bilobatus, lobi oblongi 1 mm longi, 1 mm lati. Fructus ignotus.

Dominican Republic: Along Comate river, Bayaguana, alt 200 m, March 30 1972, Alain H. Liogier 18567 (NY).

The genus Chione DC. has been described as 5-merous. This species being 4-merous, it is necessary to extend the description of the genus. The cymes are usually 3-flowered, though there can be up to 7 flowers in the same inflorescence. Chione tetramera

besides standing out by the number of flower parts, would be near to Ch. cubensis A. Rich. and Ch. impressa Urb. Ch. impressa has much shorter calyx lobes, shorter filaments, the inflorescence is much larger (up to 12 flowers), the leaves are rhombic to lanceolate, the lateral nerves more numerous and impressed above. It is to be noted that Ch. impressa has also 4 calyx lobes; I have not seen the corolla nor the stamens. Urban in his description of the species (Symb. Ant. 9: 532. 1928), does not mention the number of corolla lobes or of stamens, and this implies that their number is five. Ch. cubensis has prominent nerves on the upper surface of the leaves, the peduncles are much longer (1.5-5 cm long), the pedicels 2-10 mm long, the inflorescence is usually many-flowered.

SCOLOSANTHUS SUBSESSILIS Alain, sp. nov.

Frutex 2 m altus, rami juniores tereti pilis brevissimis obsiti, resinam exsudentes, vetustiores brunnei cortice striato, spinis paucis e basi bifurcatis usque 4 mm longis; stipulae in vaginam perbreve annularem 0.5 mm longam connatae, lobi subulati 1 mm longi, petioli usque 1 mm longi supra canaliculati; foliorum lamina elliptica vel obovato-elliptica, 5-7 mm longa, 3-5 mm lata apice rotundata vel obtusissima, basi rotundata vel cuneata, nervo medio supra ad basim in sulco prominulo vel evanescente, vel leviter impresso, subtus ad basim prominente, ad apicem nullo, lateralibus utrinque nullis, margine plana vel paullo revoluta, supra in sicco obscure viridia, subtus pallidiora chartacea. Flores ad ramos laterales breves glomerati subsessili (pedicello usque 0.5 mm longo); calycis tubus oblongus 1 mm longus, lobi 4, ovati vel oblongo-ovati, 0.5 mm longi, minute ciliolati; corolla lutea, 4 mm longa, tubus cylindraceus, apice 1 mm latus, lobi reversi, semi-orbiculares, 1 mm longi apice rotundati vel obtusi; stamina 4 filamenta basi corollae affixa, basi connata, in parte inferiore pilosa; antherae 0.5 mm longae; stylus 5 mm longus, globosus, stigmata oblongata; fructus non visus.

Dominican Republic: In thickets, on hillside, limestone hills Jaiquí Picado, Santiago, alt 300-400 m, 26 May 1969, Alain H. Lio-gier 15368 (Typus: NY).

Among the small-leaved Scolosanthus, S. subsessilis has one of the smallest corollas. The nearest species are S. wrightianus (Griseb.) C. Wright, with leaves 7-14 mm long, the flowers short-pedicellate, the calyx-lobes deltoid, the anthers 2 mm long, according to Standley; S. versicolor Vahl has apiculate leaves, the

calyx 2-2.5 mm long, the corolla violet or yellowish, 6-7 mm long. From S. densiflorus Urb., it is readily distinguished by its flowers on lateral branches, instead of being on the spines; S. densiflorus has usually larger leaves (up to 3 cm long), the calyx lobes semiorbicular, the corolla lobes almost as long as the tube.

SCOLOSANTHUS VERSICOLOR Vahl, Eclog. 1: 11. 1796.

Dominican Republic: In thickets on slope, Loma Peguera, Bonao, alt 300-400 m, 8 Aug 1970, Alain H. Liogier 17371 (NY).

This collection represents a new record for Hispaniola. The species is found in Puerto Rico and some of the Virgin Islands.

#### COMPOSITAE.

AGERATUM DOMINGENSE Spreng. Syst. 3: 446. 1826.

This species had been collected in Hispaniola only once, by Bertero, without locality. I have found it again along Comate river near Bayaguana (Alain Liogier 18566); it is very rare in Hispaniola and fairly common in Western Cuba.

FLAVERIA TRINERVIA (Spreng.) C. Mohr, U.S. Dept. Agric. Contr. Nat. Herb. 6: 810. 1901.

Dominican Republic: On roadside, between Cabral and Duvergé Alain Liogier 18314.

This weedy plant was collected in Hispaniola for the first time; I reported it also from Puerto Rico, where it appears to be extremely rare in the South West. It is quite common in Cuba; widely distributed from Southern United States to Northern South America.

VERNONIA FUSILLIFLORA Alain, sp. nov.

Frutex 60 cm altus, rami tereti, ramuli dense pilosuli, griseo-brunnei; petioli usque 1 mm longi tereti vel supra laeve canaliculati; folia obovato-oblonga, 5-8 mm longa 3-4 mm lata, basi longe in petiolum angustata, apice rotundata vel obtusa, nervo medio supra apice exserto impresso, subtus prominulo, lateralibus supra nullis, subtus utroque latere 1-2, prominulis, margine integra, supra minute et adpresse puberula, vetustiora glabrescentia glandulis luteis minutis munita, subtus dense et adpresse pilosa, pallidiora, chartacea. Capitula solitaria vel in paria, axillaria vel terminales, flores pauci, plerumque 3-4, pedicelli nulli vel 1-2 mm longi; capitula 6 mm longa, involucri bractee 2-3-seriatae, extus parce puberulae, interiores ovato-lanceolatae, acutae, usque 2 mm longae, exteriores ovatae usque 1.5 mm longae, obtusae; pappi setae interiores usque 20-25, usque 4.5

mm longae, antrorse barbatae, albidae, exteriores nullae; corollae purpureae 2.5 mm longae, lobi lineares tubo 1/2 breviores; antherae non visae; achaenia juvenilia vix 1 mm longa, glabrescentia, pallide brunnea.

Dominican Republic: Aceitillar, Baoruco Mts., in pine barren, alt 1300 m, 26 Feb 1971, Alain H. Liogier 17916 (Typus: NY).

This plant is characteristic of a group of 3 species, with outer pappus bristles lacking or very small; the first one, V. barkeri was described by Ekman, the second I named V. microphylla and this is the third one. All have small leaves, but V. pusilliflora has the smallest. The distinctive characteristics will be found in the following key:

- a. Flowers 12-13 in each head; leaves 1-2.5 cm long, glandular-punctate on both faces. V. barkeri.
- a. Flowers 3-4 in each head; leaves up to 1 cm long, glandular-punctate above only.
  - b. Leaves elliptic to obovate; involucre bracts in 3-4 series; outer series of pappus bristles present; achenes glandular. V. microphylla.
  - b. Leaves obovate-oblong; involucre bracts in 2-3 series; outer series of pappus bristles lacking; achenes glabrescent, not glandular. V. pusilliflora.

A NAME CHANGE IN PSEUDOCONYZA (COMPOSITAE - INULEAE)

W.G. D'Arcy  
Missouri Botanical Garden

Pseudoconyzia viscosa (Mill.) D'Arcy, comb. nov.

Conyza viscosa Mill., Gard. Dict. ed. 8. 1768. Type: Veracruz, Houston (BM, not seen).

Conyza lyrata var. pilosa Fern., Proc. Amer. Acad. 36: 506. 1901.

Type: Chiapas, Seler 1879 (GH, not seen).

Pseudoconyzia viscosa var. lyrata (H.B.K.) D'Arcy, stat. nov.

Conyza lyrata H.B.K., Nov. Gen. 4: 70. 1820. Type: Guayaquil, Humboldt & Bonpland (P, not seen).

Eschenbachia lyrata (H.B.K.) Britt. & Millsp., Fl. Baham. 444. 1920.

Blumea lyrata (H.B.K.) Badillo, Bol. Soc. Venez. Cienc. Nat. 10: 257. 1946.

Ernstia lyrata (H.B.K.) genus ined., Badillo, loc. cit. 1947

Pseudoconyzia lyrata (H.B.K.) Quatrec., Ciencia (Mex.) 21: 31. 1961.

Following an examination of type material in London and Paris, McVaugh (Rhodora 74: 500. 1972) noted that Conyza lyrata is a later name for C. viscosa but that the two names refer to taxa which have been considered as distinct varieties by some botanists. Thus var. viscosa refers to pale-pilose plants, less glandular than those of var. lyrata.

From the synonymy cited above it is clear that this species has perplexed botanists as to its systematic position. Although the flowers superficially resemble those of Conyza and Erigeron, the broad, dentate, glandular leaves with somewhat clasping leaf bases are anomalous in these two genera. A number of technical details of the flowers, particularly the plump, many-vened seeds, tailed anthers, pubescence along the entire dorsal surface of the style branches and absence of deltoid appendages separate this species from the Astereae and place it in the Inuleae. The illustration appearing with the protologue of Pseudoconyzia Quatr. (loc. cit.) errs in not showing the tails of the anthers.

The relationships of this genus are with Old World genera of Inuleae such as Blumea and Laggera rather than with genera in the neotropics where Pseudoconyzia viscosa occurs. These Old World genera are in need of revision. Consideration of the appropriate type species (Blumea balsamifera (L.) DC; Laggera purpurascens Sch.-Bip. ex K.H. E. Koch) argues that Pseudoconyzia is generically distinct, but when these groups are studied and the generic lines clarified, it is likely that a number of African species will be found to be congeneric with Pseudoconyzia, e.g. Blumea aurita DC; Laggera kotschyi Sch.-Bip., etc.

# ADDITIONAL NOTES ON THE GENUS AEGIPHILA. XVIII

Harold N. Moldenke

AEGIPHILA Jacq., Obs. Bot. 2: 3, pl. 27. 1767.

Partial emended synonymy: Aegiphila L., Pflanzensyst. 3: 124. 1773; A. L. Juss., Gen. Pl. 107. 1789. Manabea Aubl., Hist. Pl. Guian. 1: 61. 1775. Aegyphila Jacq. apud Planer, Gatt. Pfl. 1: 87—88 (1775) and 2: 1050. 1775. Aegiphila Sw., Nov. Gen. & Sp. Pl. Prodr. 31, sphalm. 1788. Manabaea Aubl. ex J. F. Gmel. [ed. Turton] in L., Gen. Syst. Nat. 5: 219, in syn. 1802. Omphalococca Willd. ex Roem. & Schult., Mant. 3: 10. 1827. Aegephila Vell., Fl. Flum. Icon. 1: 89, sphalm. 1827. Aegiphyla L. apud Steud., Nom. Bot., ed. 2, 1: 29. 1840. Amerina P. DC., Prodr. 9: 512—513. 1845 [not Amerina Noronha, 1790, nor Raf., 1838]. Distigma Klotzsch ex Walp., Repert. Bot. Syst. 4: 123, in syn. 1845. Brückea Klotzsch & Karst. in Karst., Ausw. Neu. Gew. Venez. 31. 1848. Bruckea Klotzsch & Karst. ex Bocq., Adansonia, ser. 1, 2: 83 & 130. 1862. Aegiphyla Steud. ex Pfeiffer, Nom. Bot. 1 (1): 64, in syn. 1873. Brueckia Klotzsch & Karst. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46, in syn. 1893. Brueckea Klotzsch & Karst. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 345, in syn. 1893. Brueckia Karst. ex Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 116, in syn. 1895. Manabaea Hedw. f. apud Dalla Torre & Harms, Gen. Siphon. 432, in syn. 1900. Aegophila Jacq. apud Post & Kuntze, Lexicon 11. 1904. Pseudaegiphila Rusby, Mem. N. Y. Bot. Gard. 7: 339. 1927. Aegiphila Jacq. ex Moldenke, Brittonia 1: 250, in syn. (obs.) 1934; Prelim. Alph. List Invalid Names [1], in syn. 1940. Manabca Aubl. apud J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 711, sphalm. 1960. Aegophila P. & K. apud Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 26, in syn. 1966. Omphalococca "Willd. ex Schult." apud Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 794, in syn. 1966. Aegiphila Briq. ex Moldenke, Résumé Suppl. 13; 6, in syn. 1966.

Additional & emended bibliography: Jacq., Obs. Bot. 2: 3, pl. 27. 1767; [Retz.], Nom. Bot. 35 & [280]. 1772; Planer, Gatt. Pfl. 1: 87—88 (1775) and 2: 1050. 1775; Reichard in L., Gen. Pl., ed. 8, 61. 1778; Sw., Nov. Gen. & Sp. Pl. Prodr. 31—32. 1788; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 259. 1789; Schreb. in L., Gen. Pl., ed. 8 [9], 1: 73 (1789) and 2: [841]. 1791; Haenke in L., Gen. Pl., ed. 8 [10], 1: 105 (1791) and 2: [789]. 1791; Lam., Tabl. Encycl. Méth. Bot. 1: pl. 70, fig. 1—3, & 71. 1791; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 2, 2: 259. 1796; Raeusch., Nom. Bot., ed. 3, 36—37 & [377]. 1797; Bosc, Nouv. Dict. Hist. Nat., ed. 1, 1: 114. 1803; Desf., Tabl. Ecol. Bot., ed. 1, 53 (1804) and ed. 2, 64 & 250. 1815; Bosc, Nouv. Dict. Hist.

Nat., ed. 2, 1: 174. 1816; Poir. in Cuvier, Dict. Sci. Nat. 1: 267 (1816) and 6: 25. 1817; Pers., Sp. Pl. 1: 339 & 342. 1817; H. B.K., Nov. Gen. & Sp. Pl., ed. quarto, 2: pl. 130 & 131 (1817), ed. folio, 2: 201—204 (1817), ed. folio, 3: [51]—52, pl. 208 & 209 (1818), and ed. quarto, 2: 248—251 (1818) and 3: [65]—66, pl. 208 & 209. 1818; Roem. & Schult. in L., Syst. Veg., ed. 15 [Stuttg.], 3: 95—96, 100—103, & [535] (1818) and 4: 698. 1819; J. A. Schult. in Roem. & Schult., L. Syst. Veg., ed. 15 [cont.], 1: 95—97 & [311]. 1820; Steud., Nom. Bot. Phan., ed. 1, 16 & 137. 1821; Spreng. in L., Syst. Veg., ed. 16, 1: 29, 419, 421, 647, & 648 (1825) and 5: 126. 1828; Kunth, Vier Bot. Abhandl. [14]—16. 1832; D. Dietr., Syn. Pl. 1: 429—430 & 630—631. 1839; Steud., Nom. Bot., ed. 2, 1: 29 & 543. 1840; Paxt., Pock. Bot. Dict., ed. 1, 8. 1840; Voigt, Hort. Suburb. Calc. 464. 1845; Benth., Bot. Voy. Sulphur 154. 1846; M. R. Schomb., Reisen Brit.-Guian. 3: [Vers. Fauna & Fl. Brit.-Guian.] 959 & 1150. 1848; Paxt., Pock. Bot. Dict., ed. 2, 8. 1849; Schau. in Mart., Fl. Bras. 9: 278—290 & [309]—311. 1851; W. Griff., Notul. 4: 173. 1854; Schnitzl., Icon. Fam. Nat. Reg. Veg. 137. 1856; Bocq., Adansonia, ser. 1, 2: 83, 84, 86, 109, 111, 113, 115, 117—119, 121, 125, 126, 128, 130, 131, 141, 143—145, 154, 155, 160, & 161 (1862) and 3: 180, 182, 183, 187—190, & 194, pl. 9, fig. 1—14, & pl. 10. 1863; Bocq., Rév. Verbenac. 83, 84, 86, 109, 111, 113, 115, 117—119, 121, 125, 126, 128, 130, 131, 141, 143—145, 154, 155, 160, 161, 178, 180, 182—184, 187—190, 192, 194, & 264, pl. 9, fig. 1—14, & pl. 10. 1863; Pfeiffer, Nom. Bot. 1 (1): 64 (1873) and 1 (2): 1834. 1874; Scheffer, Ann. Jard. Bot. Buitenz. 1: 43. 1876; Vesque, Ann. Sci. Nat. Paris, sér. 7, 1: 335. 1885; A. S. Hitchc., Ann. Rep. Mo. Bot. Gard. 4: 118. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46—47, 106, 345, 386, & 823 (1893) and pr. 1, 2: 131, 160, 320, & 341. 1894; Solered., Syst. Anat. Dicot. 712, 715, & 716. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 13. 1901; Barnhart, Bull. Torrey Bot. Club 29: 590. 1902; T. Peckolt, Bericht. Deutsch. Pharm. Gesell. 14: 478—480. 1904; Briq. in Chod. & Hassler, Bull. Herb. Boiss., ser. 2, 4: 1166—1169. 1904; Thiseit.-Dyer, Ind. Kew. Suppl. 2: 4 & 43. 1904; Hayek in Engl., Bot. Jahrb. 42: 172. 1908; D. H. Scott in Solered., Syst. Anat. Dicot., transl. Boodle & Fritsch, 1: 630, 631, & 634. 1908; Solered., Syst. Anat. Dicot. Ergänz. 255. 1908; Ramírez Goyena, Fl. Nicarag. 1: 566—567. 1911; Prain, Ind. Kew. Suppl. 4, pr. 1, 5. 1913; Donn. Sm., Bot. Gaz. 57: 425—426. 1914; Anon., Arnold Arb. Publ. 6 [Cat. Lib. Arnold Arb.] 342. 1917; Prain, Ind. Kew. Suppl. 5, pr. 1, 6. 1921; Stevens, Ann. Mycol. 26: 208. 1928; G. Klein, Handb. Pflanzenanal. 2 (1): 530 & 532. 1932; A. W. Hill, Ind. Kew. Suppl. 8: 5. 1933; F. C. Hoehne, Resen. Hist. Secc. Bot. Agron. Inst. Biol. S. Paulo 153 & 157. 1937; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 284. 1937; Fedde in Just, Bot. Jahresber. 57 (2): 708. 1938; Fedde & Schust. in Just, Bot. Jahresber. 57 (2): 400. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 5—6, 41, & 204. 1938; Sandw., Kew Bull. Misc. Inf. 1938: 373. 1938; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 416 (1939), 59 (2): 482 (1940), and 60 (2): 567—569. 1941; Wangerin & Krause in Just, Bot. Jahresber. 60

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In addition to the synonyms listed above there are 15 more variations in spelling and/or accreditation of the name Aegiphila, 2 of Brückea, and one of Stigmatococca which have been recorded by me in various of my previous publications.

LeCointe (1947) records the vernacular name "cipó pitomba" for an unidentified member of this genus, the name "uruá-rana" for another species found on the Rio Trombetas whose wood is "Branco pardacento, fibroso, tenra e muito leve", the name "pau-de-moqueu" for still another species found at Aveiros and which is used in

popular medicine "contra as mosestias dos brônquios....vomatório". Planer (1775) uses the name "Lattenstrauch" for this genus, while Bosc (1803) employs the French name "aegiphile" and its variant "égiphyle".

According to Blohm (1962) Lasser collected an unidentified species of this genus in Caicara where it is known as "borracha". Natives claim that pigs dig for the roots of this plant for food, but when horses and donkeys dig for it and eat it they become "borrachera" or intoxicated.

It should be noted here that the original publication of the accepted generic name by Jacquin (1767) was erroneously dated "1764" by me in my 1934 work on this genus — this being the date of part one of Jacquin's publication, rather than of part two. Jackson, in the "Index Kewensis" (1893), credits the genus to "Jacq. Stirp. Am. t. 16" (1763), but the name does not occur in that work, where plate 16 and the corresponding text pages 24—25 refer to and illustrate Myginda uragoga in the Celastraceae, which Stapf in the "Index Londinensis" (1929) correctly cites to "Jacq. Sel. Stirp. Amer. Hist. t. 16 (1763)" and which Jackson also cites to "Jacq. Select. Am. 24. t. 16."

The Bentham (1846) reference given in the bibliography above is often erroneously dated "1844", but the page involved here was not actually published until 1846. The H.B.K. reference dates given in the same bibliography were authenticated by Barnhart (1902).

In some works there is a reference to "R. & S. 2: 82. 1820" for this genus, but this seems to be erroneous; there is no mention of this genus on page 82 of the 1820 edition of Roemer & Schultes' work. It should also be noted here that the Hansford (1955) work is sometimes erroneously cited as Vol. "10" or "0".

Barkley (1965) lists Pseudaegiphila Rusby among the valid genera of Verbenaceae, but in my opinion it does not differ sufficiently to warrant its segregation from Aegiphila. Airy Shaw (1966) asserts that there are 160 species in Aegiphila from tropical America and the West Indies and also accepts Pseudaegiphila as a valid genus. Actually, as of now, there are 181 specific and infraspecific taxa accepted in the genus.

Ramírez Goyena (1911) gives an interesting description of Aegiphila as he knew it in Nicaragua: "Flores, por aborto, generalmente diclines, dióicos ó polígamas. Cáliz ciatiforme, acampanado ó apezonado-tubuloso, 4-fido, 4-dentado ó trunco. Corola embudada, asalvillada, excediendo algunas veces el tubo del cáliz y otras subigual, limbo 4-partido, igual. Estambres 4, iguales, exsertos en las flores masculinas y con las anteras bifidas hasta la base y celdas paralelas; en las flores femeninas filamentos breves ó inclusos. Ovario 4-locular, cavidades uniovuladas. Estilo terminal, capilar, bifido, en la flor hembra exerto, en la flor masculina incluso; estigmas con los brazos agudos. Drupa jugosa ó carnosa, epicarpio liso, con 4 pirenas ó generalmente 1—2 por aborto, huescillos distintos uniloculares, oseos, coriáceos y con la base perforada. Semilla derecha, radícula infera

breve. Arboles ó frutices algunas veces volubles con glándulas puntiformes que segregan un aceite etéreo. Ramitas generalmente opuestas y tetragonas. Hojas opuestas ó verticiladas, simples y generalmente enterisimas, por debajo glandulosas con peciolo articulado cerca de la base. Cimas tricótomas ó axilares ó en penículas superiores, en las flores masculinas generalmente flojas, y en las femeninas más compactas. Corola blanca, nerviosita, roja, ó amarillenta." This is an especially interesting description because of the author's recognition and description of distinct male and female inflorescences as being general in the genus.

The genus Amerina of Noronha, referred to in the synonymy on a previous page, is a synonym of Aglaia Lour. in the Meliaceae, while the Amerina of Rafinesque is now reduced to the synonymy of Salix Tourn. in the Salicaceae.

The Petrak Index (1957) lists the fungi, Meliola aegiphilae Stev. and Phyllachora aegiphilae Stev. as infesting members of the genus Aegiphila. Hansford (1961) renames Meliola aegiphilae, calling it Meliola cookeana var. aegiphilae (Stev.) Hansf., and says that it infests an unidentified species of Aegiphila in Guyana, based on Stevens 221. He also proposes a new species, Meliola pseudocapensis Hansf., from another unidentified species of this genus (?) in Brazil, based on Ule App. Mycoth. Bras. 17. Dennis (1970) also records Phyllachora aegiphilae from an unidentified species of Aegiphila in Guyana. Thirumalachar (1960) mentions a rust occurring on an Aegiphila species in Ecuador. It was identified by Arthur in 1918 as a Cleptomyces sp., but Thirumalachar reduces this generic name to synonymy under the earlier name, Stereostratum P. Magn. (1899) and reidentifies the rust as S. lagerhamianus (Diet.) Thirum. The host involved could be any one of 20 species and varieties of Aegiphila known from Ecuador.

Gibson (1970) gives a key to the species of Aegiphila recognized by her from Guatemala, and Macbride (1960) offers one to the species in Peru. The latter author makes some highly interesting comments about this genus of plants: "Like many plants of warm regions some species at least originally found as shrubs probably become scandent when immediate environment makes this possible; naturally, too, plants flowering as shrubs may live to become trees. The monographer prepares two plates....that illustrate the use of his terms, particularly as these apply to the calyx....While the genus contains numerous well-defined entities a lot of plants given equal standing seem to be obscure or they may be just hidden in the uniformity of characterization. The author himself has contrived only an artificial key, and mine concerning the Peruvian names, is no doubt as dubious as some of the described species. Flowers are unknown for three plants given particular names by Moldenke: A. glabrata, A. sordida, A. umbraculiformis, and their key position (as for many others) is

at most merely suggestive; also, many key characters are scarcely of taxonomic value." In my Fifth Summary (1971; pp. 791 and 793) I mention a few other problems that still exist in this genus.

To the list of excluded species and excluded binomials should be added the following:

Aegiphila subthyrsoideum Pittier = Citharexylum subthyrsoideum Pittier

Aegiphila umbellata Vell. = Feramea corymbosa Aubl., Rubiaceae

Aegiphyla inflexa Arrab. = Psychotria sp., Rubiaceae

Aegiphyla laevigata A. L. Juss. = Parameria laevigata (A. L. Juss.) Moldenke, Apocynaceae

Aegiphyla muxia Willd. = Nuxia verticillata Lam., Loganiaceae

Aegiphyla stipulata Arrab. -- in the Rubiaceae

Aegiphyla umbellata Arrab. = Feramea corymbosa Aubl., Rubiaceae

Aegiphyla viburnifolia A. L. Juss. = Elaeodendron viburnifolium (A. L. Juss.) Merr., Celastraceae

The Rosas R. 1343, distributed as Aegiphila sp., is actually Cornutia grandifolia (Schlecht. & Cham.) Schau., Fournier s.n. [acquis en Janvier 1885] in the Paris herbarium is Cornutia grandifolia var. purpusi Moldenke, Allemão 1179 is Vitex gardneriana Schau., Stork C.33, distributed as "Aegiphila probably new sp.", is something in the Rubiaceae, and J. E. Montes 27434 & 27449 are also non-verbenaceous.

#### AEGIPHILA ALBA Moldenke

Additional & emended bibliography: Moldenke, Phytologia 1: 185--186 (1937), 1: 290 (1938), 2: 90 (1945)m and 2: 388--389. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 5. 1947; Holdridge, Teesd., Myer, Little, Horn, & Marr., For. West. & Cent. Ecuad. 46. 1947; Little, Carib. Forest. 9: 269. 1953; Moldenke, Phytologia 4: 347 & 385 (1953) and 13: 319 & 341. 1966; Acosta Solis, Divis. Fitogeogr. Ecuad. 45. 1968; Moldenke, Fifth Summ. 1: 134 (1971) and 2: 844. 1971.

Recent collectors describe this species as a tree, 7--12 meters tall, the trunk 17--30 cm. in diameter 1.3 m. above its base, growing in wet primary or wet secondary woods, secondary forests, tropical rainforests, and along roadsides. The corolla is described as "white" on Játiva & Epling 354 & 543. In addition to months previously reported by me, it has been found in anthesis in January and August and in fruit in July. Additional vernacular names recorded for it are "masanorro" and "nacedora", the former name is also applied to Isertia pittieri (Standl.) Standl.

Additional & emended citations: ECUADOR: Esmeraldas: Asplund 16369 (N); Little & Dixon 21249 (N); Játiva 337 (N); Játiva & Epling 1166 (N, W--2534031). Los Ríos: Mexia 6656 (W--1592021--type). Pichincha: Játiva & Epling 354 (N, N), 543 (N); Sparre 14112 (S), 14120 (S). LOCALITY OF COLLECTION UNDETERMINED: Collector undetermined 125-49 ["Lloa Chirquil."] (P).

AEGIPHILA AMAZONICA Moldenke

Synonymy: Aegiphylla amazonica Moldenke, Fifth Summ. 1: 384, in syn. 1971.

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 5. 1947; Moldenke, Phytologia 7: 457. 1961; Moldenke, Fifth Summ. 1: 138, 144, & 384 (1971) and 2: 844. 1971.

Recent collectors have found this plant growing on non-inundated ground, in caatinga on white sand, and in the secondary margins of primary forests, and describe it as a shrub or small tree, 1--25 m. tall, the young fruit green "with a yellow-green calyx". Oliveira comments "flôr branca em cachos". In addition to months previously reported by me, it has been found in anthesis in November and in young fruit in May. The corollas are described as "white" on Ducke 864, E. Oliveira 4275, and Prance & al. 15944a.

Additional citations: BRAZIL: Amazonas: Ducke 864 (W--2592939); Prance, Maas, Woolcott, Monteiro, & Ramos 15944a (N, Rf); Prance, Philcox, Rodrigues, Ramos, & Farias 4894 (Ac, N). Pará: E. Oliveira 4275 (N).

AEGIPHILA ANOMALA Pittier

Additional & emended bibliography: Donn. Sm., Bot. Gaz. 57: 426. 1914; Moldenke, Brittonia 1: 252, 257, 263, 288--289, 291, 292, 473, & 475. 1934; Moldenke, Phytologia 13: 319--320. 1966; Moldenke, Résumé Suppl. 17: 2. 1968; Gibson, Fieldiana Bot. 24 (9): 176. 1970; Moldenke, Fifth Summ. 1: 86 & 89 (1971) and 2: 491 & 844. 1971; Moldenke, Phytologia 25: 227. 1973.

Recent collectors describe this plant as a tree, 15 m. tall, and have found it growing on hills at 1000--1300 meters altitude, flowering in January. The corollas are described as "white" on P. H. Allen 2350.

Aegiphila anomala is certainly very closely related to A. valerii Standl., but Gibson (1970) affirms that A. anomala has flowers that are "twice as large as those of A. valerii"; also, the calyx of A. valerii is truncate, while in A. anomala it is more or less lobed. On this basis, the Jiménez M. 1344, distributed as A. anomala, is actually A. valerii. Donnell Smith (1914) distinguishes A. anomala from A. odontophylla Donn. Sm. by saying that in the former the leaves are verticillate, while in the latter they are merely opposite.

Additional & emended citations: COSTA RICA: Alajuela: Brenes 6652 (F--854807), 15661 (F--857980); A. Smith 138 (F--918708), A.242 (F--941492), A.379 (F--919684, F--923655, F--923667). Car- tago: H. Pittier s.n. [Herb. Inst. Physico-geogr. Nac. C. R. 16711] (F--633316--photo of type, W--578905--type, W--578906--isotype); Stork 2290 (F--598754). PANAMA: Coclé: P. H. Allen 2350 (E--1249308).

*AEGIPHILA ARCTA* Moldenke, *Résumé Suppl.* 16: 5, nom. nud. 1968; *Act. Bot. Venez.* 6: 93—94. 1972.

Bibliography: Moldenke, *Résumé Suppl.* 16: 5. 1968; Moldenke, *Fifth Summ.* 1: 121 (1971) and 2: 844. 1971; Moldenke, *Act. Bot. Venez.* 6: 93—94. 1972.

Citations: VENEZUELA: Yaracuy: Steyermark, Bunting, & Wessels-Boer 100334 (N—-isotype, Z—-type).

#### *AEGIPHILA AUSTRALIS* Moldenke

Additional bibliography: Hill & Salisb., *Ind. Kew. Suppl.* 10: 5. 1947; Moldenke, *Phytologia* 13: 320. 1966; Moldenke, *Fifth Summ.* 1: 144 (1971) and 2: 844. 1971.

Recent collectors have found this plant growing at the edge of lakes, flowering in March, and describe it as a shrub, 2 m. tall. The corollas on Hatschbach & Guimarães 29383 are said to have been "cream"-colored.

Additional citations: BRAZIL: Santa Catarina: Hatschbach & Guimarães 29383 (Z).

#### *AEGIPHILA BARBADENSIS* Moldenke

Additional & emended bibliography: Moldenke in Fedde, *Repert. Spec. Nov.* 33: [113]—114. 1933; Moldenke, *Brittonia* 1: 270, 272, 376—377, 381, 382, & 477. 1934; Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 567. 1941; Moldenke, *Phytologia* 13: 320. 1966; Moldenke, *Fifth Summ.* 1: 109 (1971) and 2: 844. 1971.

Gooding, Loveless, & Proctor (1965) refer to this plant as a "rare endemic", but comment that "This species is very similar to A. martinicensis, and may prove to be only a form or variety of it." With this statement I fully agree. They cite McIntosh 463 from Sion Hill Gully, deposited in the herbarium of the Barbados Museum.

Emended citations: WINDWARD ISLANDS: Barbados: Warming 101 (F—642196—photo of type, W—1234886—type).

#### *AEGIPHILA BOGOTENSIS* (Spreng.) Moldenke

Additional & emended synonymy: Ehretia tomentosa H.B.K., *Nov. Gen. & Sp. Pl.*, ed. folio, 3: [51], pl. 208 (1818) and ed. quarto, 3: [65]—66, pl. 208. 1818. Ehretia tomentosa Kunth ex Spreng. in L., *Syst. Veg.*, ed. 16, 1: 648, in syn. 1825 [not E. tomentosa Lam., 1791, nor Roth, 1819]. Ehretia bogotensis Spreng. in L., *Syst. Veg.*, ed. 16, 1: 648. 1825. Ehretia tomentosa Humb. & Kunth ex D. Dietr., *Syn. Pl.* 1: 631, in syn. 1839. Amerina tomentosa (H.B.K.) P. DC., *Prodr.* 9: 512. 1845.

Additional & emended bibliography: H.B.K., *Nov. Gen. & Sp. Pl.*, ed. folio, 3: [51], pl. 208 (1818) and ed. quarto, 3: [65]—66, pl. 208. 1818; D. Dietr., *Syn. Pl.* 1: 630—631. 1839; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, pr. 1, 1: 106 & 823. 1893; Moldenke in Fedde, *Repert. Spec. Nov.* 33: 114. 1933; Moldenke, *Brittonia* 1: 258—260, 263, 283—284, 330, 347, & 373—376. 1934; Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 567. 1941; Jacks. in

Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 106 & 823. 1946; Moldenke, Mem. N. Y. Bot. Gard. 9: 175. 1955; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 106 & 823. 1960; Moldenke, Phytologia 13: 320. 1966; Moldenke, Fifth Summ. 1: 113, 121, 134, 378, & 389 (1971) and 2: 491 & 844. 1971; Moldenke, Phytologia 25: 220 & 238. 1973.

Emended illustrations: H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 3: pl. 208 [in color] (1818) and ed. quarto, 3: pl. 208. 1818.

Recent collectors have described this species as a shrub or tree, 3-4 m. tall, or subsucculent, much-branched, the calyx ferruginous, and have found it growing on paramos and in cleared forests, at altitudes of 1900-3660 m. In addition to the months previously reported by me, it has been collected in anthesis and fruit in November. The corollas are described as "white" on Asplund 7980, Espinal T. & Ramos 3245, and García-Barriga 17308 and as "yellowish-white" on García-Barriga & Hawkes 13088.

The Ehretia tomentosa Lam., referred to in the synonymy above, is a valid species in the Ehretiaceae, while E. tomentosa Roth is a synonym of E. heynei Roem. & Schult. in that same family.

The Cuatrecasas & Idrobo 26966, distributed as A. bogotensis, is actually A. cuatrecasasi Moldenke.

Additional & emended citations: COLOMBIA: Cauca: Espinal T. & Ramos 3245 (Ac), 3289 (Rf), 3434 (Ft). Cundinamarca: Bonpland s.n. (F-976553); García-Barriga 17308 (W-2569408a); Mutis 2332 (W-1561464), 5196 (W-1561137-cotype). Narifio: García-Barriga & Hawkes 13088 (N). Tolima: Purdie s.n. (F-642197-photo). Department undetermined: Mutis 5774 (W-1563803). ECUADOR: Napo-Pastaza: Asplund 17204 (N). Tunguragua: Asplund 7980 (W-2513174).

#### AEGIPHILA BOGOTENSIS var. AEQUINOCTIALIS Moldenke

Additional bibliography: Moldenke, Phytologia 13: 320. 1966; Moldenke, Fifth Summ. 1: 134 (1971) and 2: 844. 1971.

#### AEGIPHILA BOGOTENSIS f. TERNATA Moldenke, Phytologia 25: 220. 1973.

Bibliography: Moldenke, Phytologia 25: 220. 1973.

This form differs from the typical form of the species in having its leaves ternate.

Hitherto I have regarded the specimens cited below as representing A. ternifolia (H.B.K.) Moldenke and I am very grateful to my friend and colleague, Dr. Santiago López-Palacios, for pointing out to me that they do not at all represent that species, but are merely ternate-leaved examples of a common Colombian species. He plans to publish further on this subject shortly.

Citations: COLOMBIA: Cundinamarca: Goudot s.n. [near Bogotá] (A-photo, B-photo, D-photo, G-photo, K, N-photo, P-photo, S-photo, W-photo, Z-photo); F. C. Lehmann B.T.690 (K-isotype, N-type, N-photo of isotype, Z-photo of isotype).

AEGIPHILA BOLIVIANA Moldenke

Additional & emended bibliography: Moldenke in Fedde, Repert. Spec. Nov. 33: 114—115. 1933; Moldenke, Brittonia 1: 257, 270, 272, 391, 399—400, & 476. 1934; Fedde & Schust. in Bot. Jahresber. 60 (2): 567. 1941; Moldenke, Phytologia 7: 459. 1961; Moldenke, Résumé Suppl. 17: 12. 1968; Moldenke, Fifth Summ. 1: 181 & 378 (1971) and 2: 844. 1971.

Steinbach describes this as a "rare tree, 3—6 m. tall, on low mountains, sandy semidry soil", and found it growing at 300 m. altitude, flowering in October. On R. F. Steinbach 381 the flowers are described as having been "white, anthers ochre".

Additional & emended citations: BOLIVIA: Cochabamba: R. F. Steinbach 381 (N, W—2533309). Santa Cruz: J. Steinbach 5066 (F—550111—cotype), 6437 (F—642199—photo of cotype), 7250 (Ca—368617, D—652998, E—941146, F—573473), 7289 (Ca—368588, D—652987, E—941177, F—573500).

AEGIPHILA BRACHIATA Vell.

Additional & emended synonymy: Aegiphyla brachiata Arrab. ex Steud., Nom. Bot., ed. 2, 1: 29. 1840. Aegiphila brachiata Arrab. ex Walp., Repert. Bot. Syst. 4: 124. 1845. Aegiphila brachiata Vell. ex Reitz, Sellowia 3: 72, sphalm. 1951.

Additional & emended bibliography: Schau. in Mart., Fl. Bras. 9: 284 & [309—310]. 1851; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46 & 47. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1894; Glaz., Bull. Soc. Bot. France 58 [ser. 4, 11], Mém. 3: 546. 1911; Donn. Sm., Bot. Gaz. 57: 426. 1914; Moldenke, Brittonia 1: 265, 309—311, 452, & 473—476. 1934; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 46 & 47. 1946; Reitz, Sellowia 3: 72. 1951; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 46 & 47. 1960; Angely, Fl. Anal. Paran., ed. 1, 579. 1965; Moldenke, Phytologia 13: 320—321 & 339. 1966; Moldenke, Résumé Suppl. 16: 14. 1968; Reitz, Sellowia 22: 8. 1970; Moldenke, Fifth Summ. 1: 144, 184, 378, 379, & 383 (1971) and 2: 845. 1971.

Recent collectors describe this species as a shrub or small tree, 2.5—8 m. tall, the trunk 4—15 cm. in diameter, the bark pale brownish-gray, smooth, and the fruit obovate, hard, 1.5—3 cm. long, 1.3—2.9 cm. wide, yellowish, local in distribution beside "picardas" of high woods and along roadsides in cleared woodland and in capoeira. The corollas on Woolston 1201 are described as having been "yellowish" and on 1269 as "greenish-yellow"; on Hatschbach 30331 they were "cream"-colored.

The O. Camargo 2284 [Herb. Anchieta 62529], distributed as A. brachiata and so cited by Rambo (1965), is actually A. hassleri Briq., as is also Lindeman & Haas 534.

Additional & emended citations: BRAZIL: Paraná: Hatschbach 30331 (Id); Jönsson 979a (E—1036677, W—1481942). Rio Grande do Sul: O. Camargo 2164 [Herb. Anchieta 62539] (B). Santa Catarina:

Smith & Klein 13233 (N). State undetermined: Sellow 1269 [Macbride photos 17590] (F—663019—photo, W—1323308), 3012 (W—617574). PARAGUAY: Jørgensen 3662 (D—690558, E—972725, F—697021, F—767976, W—1483674); Woolston 1201 (N, S), 1269 (N, S).

# AEGIPHILA BRACTEOLOSA Moldenke

Emended synonymy: Aegiphila arborescens f. longiflora Schau. in A. DC., Prodr. 11: 650. 1847. Aegiphila arborescens f. mascula  $\alpha$  longiflora Schau. in Mart., Fl. Bras. 9: 282. 1851. Aegiphila arborescens f. foemina  $\alpha$  longiflora Schau. in Mart., Fl. Bras. 9: 282. 1851. Aegiphila arborescens var. longiflora Schau. apud Moldenke, Brittonia 1: 337, in syn. 1934. Aegiphila solanifolia Mart. ex Moldenke, Phytologia 1: 189, in syn. 1937.

Additional & emended bibliography: Moldenke in Fedde, Repert. Spec. Nov. 33: 115. 1933; Moldenke, Brittonia 1: 252, 255, 275, 280, 309, 428, 456—458, & 474—476. 1934; Fedde & Schust. in Just, Bot. Jahresher. 60 (2): 567. 1941; Hill & Salisb., Ind. Kew. Suppl. 10: 5. 1947; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 704—705. 1960; Moldenke, Phytologia 13: 321. 1966; Moldenke, Fifth Summ. 1: 113, 128, 138, 144, 378, & 382 (1971) and 2: 845. 1971; Moldenke, Phytologia 25: 235. 1973.

Schauer (1847) plainly designates his infraspecific taxa, "longiflora" and "breviflora", as forms (not varieties), saying "Flores diclini, magnitudine ac figura duplici forma obvi", even though he precedes the epithets with Greek letters. His f. breviflora he characterizes as follows: " $\delta$ : Cal. 3 lin. longus. Cor. infundibularis, tubo calycem vix aequante vel paulo excedente, limbi laciniis lanceolatis 2 lin. longis reflexis. Stamina limbo sesquilingiora.  $\eta$ : Cal. turbinato-campan. 2 1/2 lin. long. Cor. calycem limbo exiguo superans, antheras tabescentes brevistipitatas infra fauces gerens. Stylus longe exsertus." His f. longiflora is described as " $\delta$ : Cal. 4 fere lin. longus. Cor. tubo gracili 5—6 lin. metiente laciniis lanceolatis lineâ paulo longioribus reflexis. Stam. limbum duplo excedentia. Stylus inclusus bifidus.  $\eta$ : Cal. et cor. maris. Antherae abortivae, breviter stipitatae, fauci cor. inclusae. Stylus capillaris cruribus exsertis." I regard f. breviflora as A. integrifolia (Jacq.) Jacks. and f. longiflora as A. bracteolosa. In his 1851 work he modifies the description of the taxon only slightly although he reduces it in rank.

Macbride (1960) describes this species as "A tree to 5 meters of non-inundated forest" and cites only Tessmann 5363 from Loreto, Peru.

Emended citations: GUYANA: Lang & Persaud 253 (F—559108—iso-type). BRAZIL: Amazonas: Ducke 444 (F—901783, W—1693448); Holt & Blake 623 (W—1519230); Krukoff 5060 (F—810499); Spruce s.n. [In vicinibus Barra] (F—686544). MOUNTED ILLUSTRATIONS: Moldenke, Phytologia 2: 435, fig. 1. 1948 (N—drawing).

**AEGIPHILA BRASILIENSIS** Moldenke

Additional & emended bibliography: Moldenke in Fedde, Repert. Spec. Nov. 33: 115—116. 1933; Moldenke, Brittonia 1: 265, 306, 307, & 477. 1934; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 567. 1941; Moldenke, Phytologia 7: 460. 1961; Moldenke, Fifth Summ. 1: 144 (1971) and 2: 845. 1971.

The Hatschbach 22189 and Hatschbach & Guimarães 19837 & 22189, distributed as A. brasiliensis, are actually A. mediterranea var. brevilobata Moldenke.

Emended citations: BRAZIL: Rio de Janeiro: United States Exploring Exped. [Wilkes] s.n. [Rio de Janeiro] (W--55749--type).

**AEGIPHILA BREVIFLORA** (Rusby) Moldenke

Additional bibliography: Moldenke, Brittonia 1: 456—458. 1934; Moldenke, Phytologia 4: 428 & 431. 1953; Moldenke, Fifth Summ. 1: 181 (1971) and 2: 614 & 845. 1971.

Emended citations: BOLIVIA: El Beni: M. Cardenas 16, special (W--1232148--isotype).

**AEGIPHILA BUCHTIENII** Moldenke

Additional & emended bibliography: Moldenke, Brittonia 1: 278, 430—432, 441, & 472. 1934; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 567. 1941; Moldenke, Phytologia 7: 460. 1961; Moldenke, Fifth Summ. 1: 181 (1971) and 2: 945. 1971.

Emended citations: BOLIVIA: La Paz: Buchtien 1716 (W--1399627), 1717 (W--1399421--type).

**AEGIPHILA CANDELABRUM** Briq.

Additional & emended bibliography: Briq. in Chod. & Hassler, Bull. Herb. Boiss., ser. 2, 4: 1168. 1904; Moldenke, Brittonia 1: 278, 309, 426—429, 457, & 473. 1934; Moldenke, Phytologia 13: 321 & 329. 1966; Moldenke, Fifth Summ. 1: 144 & 184 (1971) and 2: 845. 1971.

Pedersen describes this species as a shrub, 2—3 m. tall, with yellow flowers, inhabiting moist woodlands, blooming in January. Hatschbach & Guimarães refer to it as a vine with greenish-cream flowers and vermilion fruit, and found it growing in "orla da mata pluvial", flowering and fruiting in April. Material has been misidentified and distributed in some herbaria as A. chrysantha Hayek. On the other hand, the Woolston 844, 1046, & 1059, distributed as A. candelabrum, are actually A. lanceolata Moldenke.

Additional & emended citations: BRAZIL: Paraná: Hatschbach & Guimarães 19157 (N, Z). PARAGUAY: Fiebrig 4875 (P); Hassler 7974 (F--686679), 8120 (F--772030--photo of type); Pedersen 3192 (N).

**AEGIPHILA CAPITATA** Moldenke

Additional & emended bibliography: Moldenke in Fedde, Repert. Spec. Nov. 33: 116—117. 1933; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 567. 1941; Moldenke, Phytologia 7: 461. 1961; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 1 & 826. 1970;

Moldenke, Fifth Summ. 1: 114 (1971) and 2: 845. 1971.

AEGIPHILA CASSELLAEFORMIS Schau.

Additional & emended bibliography: Schau. in Mart., Fl. Bras. 9: 285 & [309--310]. 1851; Moldenke, Brittonia 1: 265, 297, 303--304, 472, & 475. 1934; Moldenke, Phytologia 7: 461. 1961; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: i & 826. 1970; Moldenke, Fifth Summ. 1: 114 (1971) and 2: 845. 1971.

AEGIPHILA CAUCENSIS Moldenke

Additional & emended bibliography: Moldenke, Brittonia 1: 257, 273, 411, & 475. 1934; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 567. 1941; Moldenke, Phytologia 13: 321--323. 1966; Dwyer, Raymondiana 4: 70. 1971; Moldenke, Fifth Summ. 1: 113 & 138 (1971) and 2: 845. 1971.

Dwyer (1971) cites Woytkowski 6432 from Junín, Peru.

Emended citations: COLOMBIA: Caldas: Pennell, Killip, & Hazen 8667 (D--613015--isotype, W--1142652--isotype).

AEGIPHILA CAYMANENSIS Moldenke

Additional & emended bibliography: Moldenke, Brittonia 1: 254, 264, 353--355, & 474. 1934; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 567. 1941; Moldenke, Phytologia 7: 461. 1961; Moldenke, Fifth Summ. 1: 99 (1971) and 2: 845. 1971.

It is my opinion now that both A. barbadiensis Moldenke and A. caymanensis should be reduced to form rank under A. martinicensis Jacq. I doubt very much that they deserve any higher rank.

Emended citations: CAYMAN ISLANDS: Grand Cayman: A. S. Hitchcock s.n. [Grand Cayman, 1-17-'91] (E--117710--isotype, F--228141--type).

AEGIPHILA CEPHALOPHORA Standl.

Synonymy: Aegiphila cephalophora Moldenke, Résumé Suppl. 16: 14, in syn. 1968.

Additional & emended bibliography: Moldenke, Brittonia 1: 254, 270, 413--415, 459, 472, & 474. 1934; Fedde & Schust. in Just, Bot. Jahresber. 59 (2): 400. 1938; Moldenke, Phytologia 13: 322. 1966; Moldenke, Résumé Suppl. 15: 3 (1967) and 16: 14. 1968; Moldenke, Fifth Summ. 1: 89 & 378 (1971) and 2: 845. 1971.

Recent collectors describe this plant as a vine or woody vine, inhabiting the forest, its flowers falling off easily, and its fruit becoming orange when ripe. It has been found growing at 10 meters altitude, flowering in July and August, and fruiting in November. The corollas are described as "white" on Croat 16511 and as "greenish-white" on R. Foster 2358. Johnston describes the plant as a "vine, climbing high on forest margins, the fruiting stems pendent, fruit orange, ca. 15 mm. diameter". The densely appressed-pubescent branches, with long white antrorse hairs, distinguish this species at once from the otherwise quite similar A. deppeana Steud., where the pubescence spreads at right angles

to the branches and is more buff-colored.

The Lewis, MacBryde, Oliver, & Ridgway 1559 & 1566 and Tyson, Dwyer, & Blum 2988, distributed as A. cephalophora, are actually A. deppeana Steud., while Dwyer & Gentry 9556 and S. M. Hayden 1003 and Tyson, Dwyer, & Blum 4342 appear to be A. hoehnii var. spectabilis Moldenke.

Additional & emended citations: PANAMA: Canal Zone: Aviles 988 (F-734223); I. M. Johnston 1661 (E-1711530). Barro Colorado Island: Bailey & Bailey 662 (F-643096); Bangham 543x (F-605390); Croat 4326 (N), 6629 (N), 12563 (N, W-2620228), 16511 (N); R. Foster 2358 (N); Kenoyer 607 (F-579764—isotype, F-633356—isotype, W-1317604—type); Shattuck 988 (E-1788370).

#### AEGIPHILA CHRYSANTHA Hayek

Synonymy: Aegiphila lutea Poepp. ex Moldenke, Prelim. Alph. List Invalid Names 2, in syn. 1940 [not A. lutea Lam., 1791].

Additional & emended bibliography: Moldenke, Brittonia 1: 254, 276, 278, 418, 423, 425--426, 438, & 473--476. 1934; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 704, 705, 712, & 720. 1960; Moldenke, Phytologia 13: 322. 1966; Moldenke, Fifth Summ. 1: 134, 138, 144, 181, 378, & 381 (1971) and 2: 845. 1971; Moldenke, Phytologia 23: 418. 1972.

Recent collectors describe this plant as a shrub, 3 m. tall, with pendent branches, or a vine, the calyx green or dark-green, and the fruit at first green, later vermillion. The corollas are described as having been "yellow" on M. Silva 761 and Silva & Souza 2262, "cream-greenish" on Hatschbach & Guimarães 19157, and "greenish-yellow" on Belém 1430. It has been collected on terra firma, in open secondary vegetation, on cultivated land, in secondary forest vegetation, and at the margins of forests along roadsides, flowering in April, July, and August, and fruiting in April and July. Macbride (1960) cites Klug 2027, 2104, & 2204 and Poeppig 2314 from Loreto and Weberbauer 1289 from San Martín, Peru. He notes that Asplund described the corolla of a Loreto specimen as "sordid-yellow", Camp described the fruit as orange-red, and Klug, Hatschbach & Guimarães refer to the plant as a liana. Macbride cites Field Mus. negative 34212 and suggests that A. longipetiolata Moldenke may only be a glabrous variety of A. chrysantha [cfr. A. chrysantha var. glabra Moldenke]. The A. lutea of Lamarck, referred to in the synonymy above, is a synonym of A. laevis (Aubl.) Gmel.

The Hatschbach & Guimarães 19157, distributed as A. chrysantha, is actually A. candelabrum Briq.

Additional & emended citations: ECUADOR: Esmeraldas: Sparre 15315 (S), 15483 (S). Guayas: Eggers 14348 (F-642203—photo, F-684156—photo, W-1323272, W-1323311). Los Ríos: Asplund 15539 (N). Manabí: Eggers 14838 (F-142785, W-1323312). PERU: Loreto:

Klug 2027 (E—1005108, F—642732, W—1456686), 2104 (F—642776), 2204 (F—668847); Poeppig 2314 (F—869319—isotype, F—976275—photo of logotype). BRAZIL: Acre: Prance, Maas, Kubitzki, Steward, Ramos, Pinheiro, & Lima 11825 (Id). Amazonas: M. Silva 761 [Herb. Mus. Goeldi 32609] (N). Bahia: Belém 1430 (N, N), 1436 (N). Pará: Silva & Souza 2262 (Rf). Roraima: Prance, Steward, Ramos, & Farias 9838 (Ac, N). State undetermined: Miers s.n. [Maji to Freichal, 1 May 1838] (P).

#### AEGIPHILA CHRYSANTHA var. GLABRA Moldenke

Additional bibliography: J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 705. 1960; Moldenke, Phytologia 7: 462. 1961; Moldenke, Fifth Summ. 1: 138 (1971) and 2: 845. 1971.

Macbride (1960) suggests that A. longipetiolata Moldenke may actually be identical with the present variety.

Emended citations: PERU: San Martín: Klug 3894 (F—766408—isotype).

#### AEGIPHILA CONTURBATA Moldenke

Additional bibliography: Moldenke, Phytologia 13: 322. 1966; Moldenke, Fifth Summ. 1: 144 (1971) and 2: 845. 1971.

#### AEGIPHILA CORDATA Poepp.

Additional & emended bibliography: Bocq., Rév. Verbenac. 190. 1863; Moldenke, Brittonia 1: 254, 255, 259, 277, 443—445, & 475. 1934; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 702, 705—706, & 715. 1960; Moldenke, Phytologia 13: 322. 1966; Dwyer, Raymondi-ana 4: 70. 1971; Moldenke, Fifth Summ. 1: 138, 144, & 378 (1971) and 2: 845. 1971; Moldenke, Phytologia 23: 417. 1972.

Recent collectors describe this plant as a shrub, 2—4 m. tall, and have found it growing in low forests and in high woods at the edge of quebradas, at 210 m. altitude, flowering in February, and fruiting in October. The fruits are described as red. The corollas are said to have been "pale-yellow" on Schunke V. 1697 and "brilliant greenish-yellow" on Schunke V. 922. Dwyer (1971) cites Woytkowski 5977 from Junín, Peru. Macbride (1960) cites the type collection as Poeppig 2815, rather than 2158. Actually no collection number is given in the original publication, where it is merely asserted that the type originated in "Maynas". Macbride also cites Ll. Williams 2083 & 2318 from Loreto, Peru, and Ule 9720 from Acre, Brazil. The species also occurs in Colombia, he says, but I know only the var. colombiana from that country.

Additional & emended citations: PERU: Huánuco: Schunke V. 1697 (N). Loreto: Poeppig 2158 (F—642202—photo of type, F—976260—photo of type, F—869318—isotype); Schunke V. 922 (N).

#### AEGIPHILA CORDATA var. COLOMBIANA Moldenke

Additional bibliography: Moldenke, Phytologia 7: 463. 1961; Mol-

denke, Fifth Summ. 1: 113 (1971) and 2: 845. 1971.

This form seems closely related to A. hoehnei var. spectabilis Moldenke.

Emended citations: COLOMBIA: Santander Sur: Haught 1885 (F—1036037—isotype).

AEGIPHILA CORDATA var. VILLOSISSIMA (Moldenke) Moldenke, comb. & stat. nov.

Synonymy: Aegiphila villosissima Moldenke, Bull. Torrey Bot. Club 60: 392—393. 1933.

Additional & emended bibliography: Moldenke, Bull. Torrey Bot. Club 60: 392—393. 1933; Moldenke, Brittonia 1: 252, 255, 259, 277, 442—444, & 474. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Moldenke, Phytologia 1: 296. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 569. 1941; Moldenke, Phytologia 8: 20. 1961; Moldenke, Fifth Summ. 1: 146 (1971) and 2: 848. 1971.

Krukoff describes this plant as a woody vine, growing on terra firma, while Prance and his associates call it a tree, 5 m. tall, with yellow fruit, and encountered it growing on the margins of forests along roadsides. It has been collected in anthesis in November and in fruit in April, and has been misidentified in some herbaria as Cordia sp.

Additional & emended citations: BRAZIL: Acre: Prance, Maas, Kubitzki, Steward, Ramos, Pinheiro, & Lima 11828 (Z). Mato Grosso: Krukoff 1400 (A—isotype, B—isotype, Bm—isotype, Ca—isotype, Cb—isotype, E—isotype, K—isotype, Mi—isotype, N—isotype, N—photo of type, N—photo of isotype, N—photo of isotype, P—isotype, S—isotype, Ut—isotype, W—photo of type, Z—photo of type, Z—photo of isotype, Z—photo of isotype).

AEGIPHILA CORDIFOLIA (Ruiz & Pav.) Moldenke

Additional & emended bibliography: Pers., Sp. Pl. 1: 342. 1817; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 3: 95. 1818; Steud., Nom. Bot., ed. 1, 137. 1821; Schau. in Mart., Fl. Bras. 9: 288 & 311. 1851; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 386. 1893; Moldenke, Brittonia 1: 278, 405, 409, 438, 445—446, 459, & 475. 1934; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 569. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386 (1946) and pr. 3, 1: 386. 1960; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 704, 706, & 720. 1960; Moldenke, Phytologia 13: 322—323 & 428. 1966; Moldenke, Fifth Summ. 1: 138 & 407 (1971) and 2: 845. 1971.

Macbride (1960) cites only the type collection, Ruiz & Pavon s. n., and Macbride 3922 from Huánuco and A. Mathews s. n. from Amazonas, Peru. Fedde & Schuster (1941) misspell the abbreviation for Pavon as "Tav." The Schunke V. 906 & 1300, distributed as A. cordifolia, are actually A. spicata (Rusby) Moldenke.

Emended citations: PERU: Huánuco: Macbride 3922 (F—534984); Ruiz & Pavon s. n. [Miffa, Panatahua; Macbride photos 28378] (F—842488—isotype). Department undetermined: Ruiz & Pavon 12/68 (F—

712556).

AEGIPHILA CORIACEA Moldenke

Additional & emended bibliography: Moldenke in Fedde, Repert. Spec. Nov. 33: 118--119. 1933; Moldenke, Brittonia 1: 254, 265, 317--319, 336, & 473. 1934; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 567. 1941; Moldenke, Phytologia 7: 463. 1961; Moldenke, Fifth Summ. 1: 144 (1971) and 2: 845. 1971.

AEGIPHILA COSTARICENSIS Moldenke

Additional synonymy: Clerodendron matudae Standl., Field Mus. Publ. Bot. 17: 206--207. 1937. Clerodendron matudae Standl. apud Matuda, Am. Midl. Nat. 44: 575. 1950. Aegiphila costaricense Moldenke, Fifth Summ. 1: 378, in syn. 1971.

Additional & emended bibliography: Moldenke, Brittonia 1: 252, 255, 263, 294--295, 473, 475, & 476. 1934; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 567. 1941; Moldenke, Phytologia 5: 153 (1955) and 13: 323. 1966; Moldenke, Résumé Suppl. 16: 2. 1968; Gibson, Fieldiana Bot. 24 (9): 169 & 170. 1970; Moldenke, Fifth Summ. 1: 66, 78, 86, 121, 378, & 450 (1971) and 2: 793 & 845. 1971; Moldenke, Phytologia 23: 416. 1972.

Recent collectors describe this plant as a tree, 6--10 m. tall, with pendulous flowers, growing in rainforests or in mixed lowland forests, at altitudes of 233--1200 meters. Burger & Matta U. refer to it as "quite common in shade of forest". The corollas are said to have been "white" on Burger & Matta U. 4486 and G. N. Ross 159. Gibson (1970) avers that the species is "Readily distinguished from other local species by the 5-parted rather than 4-parted corollas, and by the lax inflorescence with greatly elongated pedicels and slender peduncles".

Additional & emended citations: MEXICO: Chiapas: Matuda 572 (F--888718), 2101 (F--945557). Veracruz: G. N. Ross 159 (W--2528187). GUATEMALA: Quezaltenango: Skutch 2012 (F--933532, W--1644385). COSTA RICA: Alajuela: A. Smith F.1818 (E--1186173, F--980786), F.1907 (F--980756). Guanacaste: Standley & Valerio 44597 (W--1253716), 44606 (W--1253721), 45538 (F--642201, W--1254162). Puntarenas: Burger & Matta U. 4486 (N); H. Pittier, Herb. Instit. Physico-geogr. Nac. C. R. 16034 (W--861265, W--1080472). PANAMA: Bocas del Toro: Pittier & Tonduz, Herb. Instit. Physico-geogr. Nac. C. R. 9167 (F--653827--isotype, W--1080331--isotype, W--1323266--type, W--1323268--isotype); Tonduz, Herb. Instit. Physico-geogr. Nac. C. R. 8564 (W--1080325, W--1323267). VENEZUELA: Carabobo: Steyermark & Steyermark 95242 (N).

AEGIPHILA CRENATA Moldenke

Additional & emended bibliography: Moldenke in Fedde, Repert. Spec. Nov. 33: 119--120. 1933; Moldenke, Brittonia 1: 252, 266, 267, 324, 326--328, & 473--476. 1934; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 567. 1941; Angely, Fl. Anal. Paran., ed. 1, 579.

1965; Moldenke, *Phytologia* 13: 323. 1966; Angely, *Fl. Anal. Fito-geogr. Est. S. Paulo*, ed. 1, 4: i & 826, map 1367. 1970; Moldenke, *Fifth Summ.* 1: 114 (1971) and 2: 845. 1971.

Emended citations: BRAZIL: Pernambuco: Pickel 3042 (W—1484782). Paraná: Dusén 10541 (D—683024—isotype, E—1036232—isotype, F—668472—isotype, F—923116—photo of isotype), 16238 (D—683024, E—1036135, F—668471); Jönsson 403a (W—1481941).

#### AEGIPHILA CUATRECASASI Moldenke

Additional bibliography: Moldenke, *Phytologia* 7: 464 (1961) and 22: 6. 1971; Moldenke, *Fifth Summ.* 1: 113 (1971) and 2: 845. 1971.

Cuatrecasas & Idrobo describe this species as a treelet, 3—5 m. tall, with "hoja herbácea, gruesa, verde grisácea haz, mas clara envés; cáliz craso, verde; corola blanca, con banda medial de los pétalos sepia hacia abajo; capullo de la corola blanco-verdoso". They found it growing at 2500 m. altitude, flowering in January. It has been misidentified and distributed in some herbaria as A. bogotensis (Spreng.) Moldenke.

The Cuatrecasas 17075 & 21007, Little 7940, and Little & Ramírez 7800, distributed as A. cuatrecasasi and so cited by me in previous installments of these notes, prove to be A. sessiliflora Moldenke instead.

Additional & emended citations: COLOMBIA: Caquetá: Cuatrecasas 8566 (W—1795382—type, W—1795383—isotype). Cundinamarca: Cuatrecasas & Idrobo 26966 (N, W—2596153, W—2596154).

#### AEGIPHILA CUATRECASASI var. NITIDA Moldenke

Bibliography: Moldenke, *Phytologia* 22: 6. 1971; Moldenke, *Fifth Summ.* 2: 845 & 967. 1971.

Citations: COLOMBIA: Cauca: Esपाल T. & Ramos 2897 (Z—type).

#### AEGIPHILA CUNEATA Moldenke

Additional & emended bibliography: Moldenke, *Brittonia* 1: 263, 292—294, 300, & 474. 1934; Fedde & Schust. in Just, *Bot. Jahresber.* 60 (2): 569. 1941; J. F. Macbr., *Field Mus. Publ. Bot.* 13 (5): 704, 706—707, 718, & 719. 1960; Moldenke, *Phytologia* 13: 323. 1966; Moldenke, *Fifth Summ.* 1: 134, 138, & 114 (1971) and 2: 845. 1971; Moldenke, *Phytologia* 25: 228. 1973.

Macbride (1960) cites Killip & Smith 28379 & 28386 from Loreto, Peru, and Ule 9858 from Acre, Brazil. Schunke describes the plant as a shrub, 1—2 m. tall, the leaves dark-green and "coriaceous", the sepals green, the corollas white, and the anthers yellow. He found it growing at 300 m. altitude, flowering in August. It has also been found in anthesis in June. The Schunke V. 3493, distributed as A. cuneata, is actually a species of Solanum in the Solanaceae.

Additional & emended citations: PERU: Loreto: Killip & Smith 28379 (F—631756), 28386 (F—631757—isotype); Schunke V. 2695 (N,

W-2617021). Madre de D'ios: R. E. Schultes 6455 (W-2639542).  
 BRAZIL: Acre: Ule 9859 (F-895692).

AEGIPHILA CUNEATA var. HIRSUTISSIMA Moldenke

Additional bibliography: J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 707. 1960; Moldenke, Phytologia 13: 323. 1966; Moldenke, Fifth Summ. 1: 139 (1971) and 2: 845. 1971.

Macbride (1960) comments that this variety "is well-named". He cites only the type collection, Killip & Smith 29040, from Loreto, Peru.

AEGIPHILA DENTATA Moldenke

Additional bibliography: F. C. Hoehne, Resen. Hist. Secc. Bot. Agron. Inst. Biol. S. Paulo 153. 1937; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 567. 1941; Angely, Ind. Ang. 10. 1959; Moldenke, Phytologia 7: 467. 1961; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: i & 826. 1970; Moldenke, Fifth Summ. 1: 145 (1971) and 2: 845. 1971.

Fedde & Schuster (1941) erroneously imply that this species is based on two collections which they refer to as G. Edwall 4362 & 15614. Actually it is based on a single unnumbered Edwall collection which is no. 4362 in the Herv. Geogr. e Geol. S. Paulo and no. 15614 in the herbarium of the Instituto de Botânica at São Paulo.

AEGIPHILA DEPPEANA Steud., Nom. Bot., ed. 2, 1: 29 [as Aegiphyla deppeana]. 1840; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46. 1893.

Additional & emended synonymy: Aegiphila brachiata Schlecht. & Cham., Linnaea 6: 371. 1831 [not A. brachiata Vell., 1825].  
Aegiphyla brachiata Schlecht. apud Steud., Nom. Bot., ed. 2, 1: 29, in syn. 1840. Aegiphila brachiata Cham. & Schlecht. apud Walp., Repert. Bot. Syst. 4: 122. 1845. Aegiphila deppeana Steud. apud Walp., Repert. Bot. Syst. 4: 122, in syn. 1845. Aegiphila berteriana Schau. in A. DC., Prodr. 11: 654. 1847. Aegiphila pacifica Greenm., Proc. Am. Acad. 33: 485. 1898. Aegiphila brachiata Schlecht. apud Donn. Sm., Bot. Gaz. 57: 426. 1914. Aegiphila deppeana Moldenke, Suppl. List Invalid Names [1], in syn. 1941.

Additional & emended bibliography: Schlecht. & Cham., Linnaea 6: 371. 1831; Steud., Nom. Bot., ed. 2, 1: 29. 1840; Walp., Repert. Bot. Syst. 4: 122. 1845; Schau. in A. DC., Prodr. 11: 654--655. 1847; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46. 1893; Greenm., Proc. Am. Acad. 33: 485. 1898; Thiselet-Dyer, Ind. Kew. Suppl. 2: 4. 1904; Donn. Sm., Bot. Gaz. 57: 426. 1914; P. C. Standl., Contrib. U. S. Nat. Herb. 23: [Trees & Shrubs Mex.] 1253--1254. 1924; Moldenke, Brittonia 1: 275, 276, 280, 311, 450--452, & 472--477. 1934; Moldenke, Phytologia 1: 197--198 & 223 (1937) and 1: 291. 1938; P. C. Standl., Field Mus. Publ. Bot. 18:

995. 1938; Moldenke, *Phytologia* 1: 382—383 (1940), 2: 62 (1941), and 2: 90. 1945; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, pr. 2, 1: 46. 1946; Moldenke, *Phytologia* 2: 391—392 (1947), 2: 434 (1948), 4: 351 & 386 (1953), and 5: 153. 1955; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, pr. 3, 1: 46. 1960; Moldenke, *Phytologia* 7: 467—468 (1961) and 13: 323. 1966; Gómez Pompa, *Estud. Bot. Reg. Misantla* 93. 1966; Moldenke, *Résumé Suppl.* 16: 3 & 14. 1968; Gibson, *Fieldiana Bot.* 24 (9): 169—171. 1970; Moldenke, *Fifth Summ.* 1: 66, 78, 86, 89, 113, 121, 133, 354, 378, 379, 382, & 383 (1971) and 2: 845. 1971; Moldenke, *Phytologia* 23: 416 (1972) and 25: 227. 1973.

Recent collectors describe this species as a shrub, climbing shrub, or tree, 1.3—4 m. tall, often vining, with a stem diameter of 2—4 cm., the leaves "firmly membranous", rich-green above, pale grayish-green beneath, and the fruit orange, and have encountered it growing in low forests, "in scraps of forest along trails containing large 'espaves'", on riverbanks, in gravel riverbeds, and at forest edges, at altitudes of sea-level to 690 meters, flowering from December to March and in May, fruiting in March. Ventura A. calls it abundant in matorral "loma cerca de la plaza", while Chavelas P., Esparza, & Aceves found it in a high evergreen forest with Scheelea liebmanni, Spondias mombin, Enterolobium cyclocarpum, and Calophyllum brasiliense, and in red well-drained soil of old secondary forests with Ceiba pentandra, Scheelea liebmanni, Spondias sp., Bursera simaruba, Picramnia antidesma, and Apeiba tiborbous.

The corollas are said to have been "yellow" on Chavelas P., Esparza, & Aceves ES.2784 & ES.2848, Ortiz 714, Stern, Eyde, & Ayensu 1828, and Tyson, Dwyer, & Blum 2988 & 3100, "pale-yellow" on Lewis, MacBryde, Oliver, & Ridgway 1559, "yellowish-green" on Ventura A. 3382, "gray-green" on Steyermark, Bunting, & Blanco 101376, and "white" on Uribe Uribe 5874. The Stern, Eyde, & Ayensu 1828 collection is a voucher for wood sample 33652 in the Missouri Botanical Garden's wood collection.

Gibson (1970) gives the species' distribution as Guatemala (Petén), southern Mexico, Nicaragua, and Costa Rica. It is, of course, also known from Panama, Colombia, French Guiana, and Venezuela.

Dr. López-Palacios, in a personal communication to me, points out that A. deppeana, at least insofar as it occurs in Venezuela, is very similar in the herbarium to A. glandulifera var. pyramidata L. C. Rich. & Moldenke, but is more densely pubescent in all its parts and not ultimately glabrescent and the calyx is 5-toothed rather than subtruncate. While known thus far only from "Steyermark 101376" from Apure, he maintains that it is to be expected in other Venezuelan localities, especially in those states adjacent to the Colombian boundary.

Material has been misidentified and distributed in some herbaria as A. cephalophora Standl., but the latter species is easi-

ly distinguished by its more capitate-congested inflorescences and white, closely appressed, antrorse pubescence on the branches. The Biolley 4052, cited below, was originally distributed as Buddleia elliptica Mart. & Gal.

Additional & emended citations: MEXICO: Chiapas: Seler & Seler 2005 (W--1205967). Hidalgo: Liebmann 11302 (W--1315085), 11303 (W--1315086). Nayarit: E. W. Nelson 2245 (F--599759). Oaxaca: Martínez-Calderón 418 (W--1808132). Tamaulipas: Schiede 1105 (F--642204--photo of type). Veracruz: Chavelas P., Esparza, & Aceves ES.2784 (Ip), ES.2846 (Ip); Liebmann 11936 (F--601252, W--1406645); Orcutt 3057 (Du--155167, F--279111), 3418 (F--280123); Ventura A. 3382 (N); Il. Williams 8872 (F--898000). State undetermined: Sessé, Mociffo, Castillo, & Maldonado 603 (F--847809), 1074 (F--849273). MEXICAN OCEANIC ISLANDS: Juana Ramirez: Edw. Palmer 464 (W--463388). Maria Madre: Maltby 90 (W--314836), 107 (W--314852, W--573957), 146 (W--314891), s.n. (W--573876); E. W. Nelson 4245 (W--347988), 4254 (F--600636, W--345997). GUATEMALA: Petén: Ortiz 714 (N). COSTA RICA: Alajuela: Biolley 4052 (W--1362972). Guanacaste: Dodge & Thomas 6189 (E--1158819); Standley & Valerio 46358 (W--1254599), 46582 (W--1254721). San José: Ørsted 11179 (W--1269900). Department undetermined: C. W. Dodge 6189 (F--891800). PANAMA: Chiriqui: H. Pittier 2842 (W--677299). Los Santos: Lewis, MacBryde, Oliver, & Ridgway 1559 (E--1887577, W--2545846), 1566 (E--1887676, W--2545889); Stern, Eyde, & Ayensu 1828 [wood spec. USW.33652] (E--1835861, W--2490307), 1876 [wood spec. USW. 33687] (E--1837132, W--2490164); Tyson, Dwyer, & Blum 2988 (E--1820900), 3100 (E--1820899). COLOMBIA: Antioquia: Uribe Uribe 5874 (N). Atlántico: Dugand G. 950 (F--848980); Elias 1621 (F--931879). Bolívar: F. W. Pennell 4099 (W--1043004). Magdalena: Balbis s.n. [1822] (F--969771--photo); H. H. Smith 881 (Au, Ca--584905, D--528133, E--117695, F--137869, W--533248), 1864 (D--528134, E--117696, F--138706, W--533969). VENEZUELA: Apure: Steyermark, Bunting, & Blanco 101376 (Z).

#### AEGIPHILA DUCKEI Moldenke

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 5. 1947; Moldenke, Phytologia 7: 468. 1961; J. A. Steyermark, Act. Bot. Venez. 1: 101. 1966; Moldenke, Fifth Summ. 1: 145 (1971) and 2: 845. 1971.

AEGIPHILA ELATA Sw., Nov. Gen. & Sp. Pl. Prodr. 31 [as "Aegiphila elata"]. 1788; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 259. 1789 [not A. elata Cham., 1851].

Additional & emended synonymy: Knoxia scandens foliis cordato-ovatis pedunculis multipartitis alaribus P. Browne apud Sw., Ind. Occid. 1: 254, in syn. 1797. Aegiphila foliis elliptico-acuminatis

membranaceis, paniculis terminalibus, calycibus pubescentibus Sw. apud Willd. in L., Sp. Pl., ed. 4, 1: 616, in syn. 1797. Nuxia ? elata (Sw.) Pers., Syn. Pl. 1: 132. 1805. Knoxia scandens P. Browne apud Poir. in Lam., Encycl. Méth. Suppl. 1: 151, in syn. 1810. Nuxia ? elata Pers. apud Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 3: 102, in syn. 1818. Aegiphyla cornifolia Kunth apud Steud., Nom. Bot., ed. 2, 1: 29. 1840. Aegiphyla elata Sw. apud Steud., Nom. Bot., ed. 2, 1: 29. 1840. Aegiphyla laevis Poepp. ex Walp., Repert. Bot. Syst. 4: 119. 1845 [not A. laevis Aubl., 1789, nor (Aubl.) Gmel., 1789, nor (Aubl.) Sw., 1809, nor Bocq., 1920, nor Griseb., 1864, nor (Jacq.) Gmel., 1947, nor Juss., 1862, nor Vahl, 1851, nor Willd., 1797]. Aegiphyla macrophylla A. Rich. apud Griseb., Cat. Pl. Cuba 216, in syn. 1866 [not A. macrophylla Desf., 1821, nor Humb., 1818, nor Humb. & Bonpl., 1821, nor Humb. & Kunth, 1839, nor H.B.K., 1817, nor Kunth, 1839, nor Sieber, 1847]. Aegiphyla cornifolia Kunth apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46. 1893. Nuxia elata Pers. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 320, in syn. 1894. Aegiphyla sylvatica Sw. ex Moldenke, Brittonia 1: 462, in syn. 1934 [not A. sylvatica Moldenke, 1933]. Aegiphyla alata Sw. ex Moldenke, Brittonia 1: 462, in nota (1934) and Alph. List Invalid Names [1], in syn. 1942. Aegiphyla elata L. ex Moldenke, Brittonia 1: 462, in nota (1934) and Alph. List Invalid Names [1], in syn. 1942. Aegiphyla elata Sch. ex Moldenke, Alph. List Invalid Names [1], in syn. 1942. Aegiphyla elata Sw. ex Moldenke, Phytologia 1: 198, in syn. 1937. Aegiphyla levis Wright ex Moldenke, Résumé 229, in syn. 1959 [not A. levis (Aubl.) Gmel., 1934, nor Vahl, 1940]. Aegiphyla elata Steud. ex Uphof, Dict. Econ. Pl., ed. 2, 13. 1968.

Additional & emended bibliography: Sw., Nov. Gen. & Sp. Pl. Prodr. 31. 1788; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 52 & 259 (1789) and ed. 13, pr. 2, 2: 42 & 259. 1796; Raeusch., Nom. Bot., ed. 3, 37. 1797; Pers., Syn. Pl. 1: 132. 1805; Pers., Sp. Pl. 1: 340. 1817; H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: 203 (1817) and ed. quart., 2: 251. 1818; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 3: 102 & [535]. 1818; Steud., Nom. Bot. Phan., ed. 1, 16. 1821; Kunth, Vier Bot. Abhandl. 15—16. 1832; Paxt., Pock. Bot. Dict., ed. 1, 8 (1840) and ed. 2, 8. 1849; Schau. in Mart., Fl. Bras. 9: 287 & [309—310]. 1851; Bocq., Rév. Verbenac. 190. 1863; A. S. Hitchc., Rep. Mo. Bot. Gard. 4: 118. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46 (1893) and pr. 1, 2: 320 & 341. 1894; Barnhart, Bull. Torrey Bot. Club 29: 590. 1902; Donn. Sm., Bot. Gaz. 57: 426. 1914; Moldenke, Brittonia 1: 252, 254, 257—260, 264, 275, 279, 320, 364, 395—397, 422, 449, 462—466, & 472—477. 1934; Yunker, Field Mus. Publ. Bot. 9: 329. 1940; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 46 (1946) and pr. 2, 2: 320 & 341. 1946; Hansford, Proc. Linn. Soc. Lond. 160: 134. 1948; Asprey & Robbins, Ecolog.

Monog. 23: 374 & 411. 1953; Ciferri, Mycopath. 7: 180. 1954; Hansford, Sydowia 10: 46. 1957; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 46 (1960) and pr. 3, 2: 320 & 341. 1960; Hansford, Ann. Myc., ser. 2, Beih. 2: 687. 1961; Liogier, Rhodora 67: 350. 1965; Moldenke, Phytologia 13: 323-324. 1966; Moldenke, Résumé Suppl. 16: 3 & 14 (1968) and 17: 2. 1968; Uphof, Dict. Econ. Pl., ed. 2, 13. 1968; Dennis, Kew Bull. Addit. Ser. 3: 258. 1970; Gibson, Fieldiana Bot. 24 (9): 171. 1970; Moldenke, Fifth Summ. 1: 27, 66, 78, 81, 82, 86, 89, 94, 99, 102, 104, 109, 111, 114, 121, 128, 131, 133, 354, 377-381, & 383-385 (1971) and 2: 533, 574, 576, 614, 845, & 967. 1971; C. D. Adams, Flow. Pl. Jam. 634, 635, & 800. 1972; Moldenke, Phytologia 23: 417 (1972) and 25: 228, 235, & 240. 1973.

Recent collectors describe this plant as a vine or woody vine in trees, a vine-like, scandent, or somewhat scandent shrub, 2-3.5 m. tall, often slightly straggling and even to 20 feet high. Steyermark describes the leaves as "firmly membranous, rich-green above, pale-green beneath, richly venose beneath; calyx olive-green", while Breteler says "leaves with glands along the midrib, papery, slightly glossy, medium-green above, paler beneath; calyx pale-green; corolla-tube about 8 mm. long". The fruit is described as yellow-green, yellow, or orange-yellow. The corollas were "yellow" on Breteler 3921, Bristan 592, and Webster & Wilson 5037, "creamish" on Gentle 4457, "pale-yellow" on Gentle 6752, Molina R., Williams, Burger, & Wallenta 17488, and Steyermark, Bunting, & Blanco 101646, "yellowish-white" according to Yuncker (1940), and "greenish" on Croat 5506. Pollen specimens were taken from Gentle 6752 for the palynological reference collection at the University of Texas.

The species has been collected by recent botanists in cafetal, thickets on foothills, woods bordering savannas, open sites at the edge of rivulets, and cutover forest areas in barrancos, and on steep wooded limestone slopes or grass-covered rocky banks in cloud-forest-subparamo regions, at altitudes of 200 to 1000 meters, flowering in May, and fruiting in February, April, and September (in addition to months previously reported by me in this series of notes). The vernacular names, "Juan grande" and "spirit weed", are recorded for it.

It should be noted here that the H.B.K. reference dates, cited in the emended bibliography above, have been authenticated by the late Dr. J. H. Barnhart (1902). It should be noted that the A. macrophylla of Desfontaines, referred to in the synonymy above, is actually a synonym of A. martinicensis Jacq., that accredited to Sieber belongs in the synonymy of Warscewiczia coccinea (Vahl) Klotzsch, while that accredited to Humboldt, to Humboldt & Bonpland, to Humboldt & Kunth, to Humboldt, Bonpland, & Kunth, or to Kunth alone will be discussed in full by my friend, Dr. López-Palacios in a paper now in preparation by him. The A. laevis of Grisebach is a synonym of A. laxiflora Benth., while the seven other homonyms of this name belong in the synonymy of A. laevis

(Aubl.) Gmel., where A. levis (Aubl.) Gmel. and A. levis Vahl also belong.

Adams (1972) asserts that in Jamaica A. elata is "Rather common, on banks and in hillside thickets" from sea-level to 4000 feet altitude, flowering "most of the year", fruiting from April to September. He cites Adams 6655 & 11200, Jamaican Plants 1155, and Proctor 23913, giving the species' overall distribution as "Mexico to Venezuela, Greater Antilles, Martinique, Barbados; Grand Cayman". He comments that "The only really well known species of Aegiphila in Jamaica is A. elata. When other more complete material has been examined and compared in the living state, and differences in floral structure inherent in the heterostylous or incipient dioecious conditions are understood, besides the full ranges of hairiness, inflorescence-branching and leaf-shape, a drastic taxonomic revision may be required."

Uphof (1968) states that the leaves of A. elata are used in the treatment of ulcers, diarrhoea, and dysentery. Hansford (1961) reports the fungus, Asteridiella aegiphilae Hansf. [Irenina aegiphilae Hansf., Meliola renovata Cif.], growing on Aegiphila elata in Hispaniola, Cuba, and Trinidad, basing his record on Ciferri 52, Wright 406 & 563, Wright Fung. Cub. 883, and Baker s. n. [IMI 19361]. Dennis (1970) also records it on this host in Trinidad.

Gooding, Loveless, & Proctor (1965) tell us that A. elata was reported from Barbados by Maycock, but that there is no confirming specimen of it in the herbarium of the Barbados Museum,

Dr. López-Palacios, in a personal communication to me, states that the Aristeguieta & Pannier 1856, cited by me as A. elata in a previous installment of these notes, actually represents a variety of this species which he plans to describe shortly. It is therefore very possible that some of the other Venezuelan and perhaps other South American material previously cited a typical A. elata may prove to represent this new variety, differing in its ovate leaf-blades and more arborescent growth.

Material of A. elata has been misidentified and distributed in some herbaria as belonging to the Rubiaceae.

Additional & emended citations: MEXICO: Oaxaca: Ll. Williams 9281 (F-897603), 9354 (F-897511). Tabasco: Matuda 3031 (F-1027180), 3081 (F-1027529), 3406 (F-1027129, Ws); Rovirosa 421 (W-1323309). Veracruz: Ll. Williams 9143 (F-897406), 9271 (F-897496), 9566 (F-897916). GUATEMALA: Alta Verapaz: Türckheim 7961 (W-398422, W-1323277). El Petén: Contreras 6170 (Au). Izabal: Contreras 7603 (Au); P. C. Standley 23981 (W-1139642), 24088 (W-1139750), 24684 (W-1150503). BRITISH HONDURAS: Burns 10 (F-659150); Gentle 2633 (F-1005313), 2843 (F-1003765), 3047 (F-1003922), 4457 (MI), 6752 (Au-224739); Schipp 216 (Ca-396542, E-989391, F-659054, W-1588527). HONDURAS: Atlántida: P. C. Standley 53746 (F-584266, W-1407930), 53758 (F-583373, W-

1407940), 54259 (F—583549, W—1408204), 54759 (F—584263, W—1408461), 55166 (F—583280, W—1408699); Yuncker 4749 (F—749212); Yuncker, Koeppe, & Wagner 8377 (F—944949). Cortés: Carleton 485 (W—1208469), 638 (W—1208538). Santa Bárbara: Thieme 5412 (F—574647, W—1323274). Yoro: Severén 69 (W—1168343); P. Wilson 656 (W—1323279). COSTA RICA: Alajuela: Brenes 6193 (F—854881), 20535 (F—865969); Molina R., Williams, Burger, & Wallenta 17488 (N). Cartago: A. Gentry s.n. [August 17, 1967] (Ws). Limón: Standley & Valerio 48701 (W—1305670). Puntarenas: H. Pittier, Herb. Inst. Physico-geogr. Nac. C. R. 12017 (W—1323278); Tonduz, Herb. Inst. Physico-geogr. Nac. C. R. 6782 (W—1080308). PANAMA: Colón: J. A. Duke 15269 (Oh). Darién: Bristan 592 (E—1938941, Rh). Panamá: R. S. Williams 829 (W—678310, W—1316809). Barro Colorado Island: Croat 5506 (Ac, N). CUBA: Las Villas: Britton & Britton 5086 (F—284074); Jack 7029 (W—1476532). Oriente: Shafer 1762 (F—285028, W—659916), 4384 (F—286394, W—697695), 8804 (W—696653); C. Wright 429 (E—117708), 1354 (E—117709). Pinar del Río: Curtiss III s.n. (F—134869). Province undetermined: Eggers 5184 (W—1323276); Sagra "X" (N). CAYMAN ISLANDS: Grand Cayman: A. S. Hitchcock s.n. [Grand Cayman, 1-17-'91] (E—117711, E—117712, E—117713); Millspaugh 1281 (F—61281); Rothrock 158 (F—245011), 235 (F—245025). JAMAICA: Crawford 758 (D—539391); Fawcett 8012 (F—146412); Harris 6064 (F—145657), 10021 (F—243075, W—656838), 10726 (F—250563), 11082 (F—325140, W—699871), 11746 (E—792562, F—438764, W—790808); Hart s.n. (W—1323275); A. S. Hitchcock s.n. (E—117707); Maxon 8820 (W—1182376); Maxon & Killip 747 (F—500733, W—1046340); Nichols 75 (E—117706, F—146993, W—429029); Webster & Wilson 5037 (Mi). HISPANIOLA: Dominican Republic: Abbott 1368 (W—1079007), 2386 (W—1079669); Eggers 1602 (W—1323280); Ekman H. 13279 (W—1557852). Haiti: Bertero 35, in part (E—117705); Ekman H. 5151 (W—1412587); Leonard & Leonard 13072 (W—1451753, W—1451754). TRINIDAD & TOBAGO: Trinidad: Trin. Bot. Gard. Herb. 2384 (W—1323273), 2387 (W—1323317), 2390 (W—1361114). COLOMBIA: Arauca: López-Palacios 2007 (Ft). Chocó: Romero Castañeda 6108 (N). Tolima: Pérez-Arbeláez & Cuatrecasas 6529 (W—1774219). Valle del Cauca: F. C. Lehmann 8410 (F—689793). VENEZUELA: Apure: Steyermark, Bunting, & Blanco 101646 (Rf). Bolívar: J. A. Steyermark 86729 (N); Ll. Williams 12828 (W—1800774). Cara-bobo: Kuntze 1730 (F—297789). GUYANA: De la Cruz 3320 (Ca—300630, D—622683, E—908866, F—544018, W—1285593). SURINAM: Samuels s.n. [Forest of Zandery] (W—538022). FRENCH GULANA: W. E. Broadway 421 (W—1068700), 651 (W—1068833). BOLIVIA: Santa Cruz: J. Steinbach 3259 (F—552945). CULTIVATED: Florida: Gillis

9915 (Go); Popenoe 32 (Ar—19746, Ar—19747).

**AEGIPHILA ELEGANS Moldenke**

Additional & emended bibliography: Moldenke, *Brittonia* 1: 186 (1932) and 1: 259, 278, 444, 442, 458—461, 474, & 476. 1934; A. W. Hill, *Ind. Kew. Suppl.* 9: 6. 1938; Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 569. 1941; Moldenke, *Inform. Mold. Set 51 Spec.* [1]. 1956; J. F. Macbr., *Field Mus. Pub. Bot.* 13 (5): 704 & 707. 1960; Moldenke, *Phytologia* 13: 324 (1966) and 14: 427. 1967; Moldenke, *Fifth Summ.* 1: 114, 134, 138, 145, & 181 (1971) and 2: 845. 1971.

Macbride (1960) cites Killip & Smith 26338 from Junín and Killip & Smith 27055 & 27991 from Loreto, Peru. He also quotes Asplund to the effect that the branches of this plant are subscaudent and the fruits orange, and says that it occurs also in Brazil (actually also in Colombia and Ecuador). Krukoff refers to it as a vine.

Emended citations: PERU: Junín: Killip & Smith 26338 (F—632905, W—1460292). Loreto: Killip & Smith 27055 (F—632952—*isotype*, W—1460858—*type*), 27562 (F—633137, W—1461298), 27991 (F—615849, W—1461656). BRAZIL: Amazonas: Krukoff 8701 (F—927878).

**AEGIPHILA ELONGATA Moldenke**

Additional bibliography: A. W. Hill, *Ind. Kew. Suppl.* 9: 6. 1938; Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 567. 1941; Moldenke, *Phytologia* 7: 469—470. 1961; Moldenke, *Fifth Summ.* 1: 181 (1971) and 2: 845. 1971.

Emended citations: BOLIVIA: La Paz: Buchtien 1645 (F—642206—*photo of type*, W—1399450—*type*).

**AEGIPHILA EXIGUIFLORA Moldenke**

Additional bibliography: Hill & Salisb., *Ind. Kew. Suppl.* 10: 5. 1947; Moldenke, *Phytologia* 7: 470. 1961; Moldenke, *Fifth Summ.* 1: 145 (1971) and 2: 845. 1971.

**AEGIPHILA FALCATA** Donn. Sm., *Bot. Gaz.* 18: 7 [as "Aegyphila falcata"]. 1893; Durand & Jacks., *Ind. Kew. Suppl.* 1, pr. 1, 12. 1901.

Synonymy: Aegyphila falcata Donn. Sm., *Bot. Gaz.* 18: 7. 1893. Aegipjila falcata Donn. Sm. ex Moldenke, *Résumé Suppl.* 18: 8, in *syn.* 1969. Aegiphila martinicensis f. falcata (Donn. Sm.) Gibson, *Fieldiana Bot.* 32: 176. 1970.

Additional & emended bibliography: Durand & Jacks., *Ind. Kew. Suppl.* 1, pr. 1, 12. 1901; Donn. Sm., *Bot. Gaz.* 57: 426. 1914; Moldenke, *Brittonia* 1: 247, 252, 270, 363—364, 373, 465, 467, 473, 475, & 476. 1934; Durand & Jacks., *Ind. Kew. Suppl.* 1, pr. 2, 12 (1941) and pr. 3, 12. 1959; Moldenke, *Phytologia* 7: 470. 1961; Moldenke, *Résumé Suppl.* 16: 3 (1968), 17: 2 (1968), and

18: 8. 1969; Gibson, *Fieldiana Bot.* 32: 176. 1970; Anon., *Biol. Abstr.* 52 (6): B.A.S.I.C. S.7. 1971; Fryxell, *Biol. Abstr.* 52: 3079. 1971; Moldenke, *Phytologia* 20: 488. 1971; Moldenke, *Fifth Summ.* 1: 66, 78, 86, 89, 381, 384, & 385 (1971) and 2: 845. 1971.

Recent collectors describe this species as a vine, as a shrub with several spreading leafy branches, 2 m. tall, or even as a tree, 6--8 m. tall, the branches and leaves horizontal, the inflorescence pendulous, both terminal and axillary, the calyx green, and the corolla varying in shape. The corolla is said to have been "yellow" on Burger & Liesner 6878 and Lewis, Dwyer, Elias, & Robertson 857, "yellowish-white" on Jiménez M. 4134, "greenish-yellow" on Wedel 1351, "greenish" on J. A. Duke 3805, and "white" on Ebinger 954 and Jiménez M. 3419.

The species has been found growing on partly shaded gravel banks near rivers, in banana and cacao plantations on level areas, in remnant forests on steep hills, in secondgrowth forests, in clearings and open grazed areas, and at the edges of railroads and rivers and adjacent rainforests, at altitudes of 50 to 200 meters, flowering in August, October, and December (in addition to months previously reported by me in this series of notes). Material has been misidentified and distributed in some herbaria as *A. paniculata* Moldenke and *Callicarpa acuminata* H.B.K.

Additional & emended citations: MEXICO: Chiapas: F. Miranda 7632 (W--2508314); Purpus 6982 (Ca--172791), 7521 (Ca--187701). GUATEMALA: Escuintla: J. D. Smith 2111 (F--633314--photo of type, W--55747--isotype, W--1323285--type). Quezaltenango: Tonduz & Rojas 148 (W--1014892). Retalhuleu: Rojas 584 (W--184714, W--1080741); J. D. Smith 1479 (F--642208--photo, W--44613, W--1323281). Suchitepéquez: Maxon & Hay 3617 (W--473550). COSTA RICA: Cartago: H. Pittier 11244 (W--1323284), 13216 (W--354412, W--1323286). Heredia: Jiménez M. 3419 (N), 4134 (N). Limón: Burger & Liesner 6878 (N). PANAMA: Bocas del Toro: Dunlap 26 (F--579985); Lewis, Dwyer, Elias, & Robertson 857 (E--1881643); H. Pittier 8643 (W--1323282); Stork 26 (W--1166818); Tonduz 8627 (W--1323283), 9292 (W--354257, W--1323287), 9293 (W--577235, W--1323288); Wedel 1351 (E--1228054). Coclé: Ebinger 954 (E--1938931). Panamá: J. A. Duke 3805 (Ca--1213136, E--1786041). Barro Colorado Island: Ebinger 243 (E--1938934).

#### AEGIPHILA FARINOSA Moldenke

Additional bibliography: E. J. Salisb., *Ind. Kew. Suppl.* 11: 5. 1953; Cuatrecasas, *Revist. Acad. Colomb. Cienc.* 10: 246. 1958; Moldenke, *Phytologia* 13: 324. 1966; Moldenke, *Fifth Summ.* 1: 114 (1971) and 2: 845. 1971.

Cuatrecasas (1958) reports that this species inhabits the "selva subandina".

**AEGIPHILA FASCICULATA** Donn. Sm.

Additional & emended bibliography: Prain, Ind. Kew. Suppl. 5, pr. 1, 6 (1921) and pr. 2, 6. 1960; Moldenke, Phytologia 7: 470—471. 1961; Gibson, Fieldiana Bot. 24 (9): 170 & 171. 1970; Moldenke, Fifth Summ. 1: 78, 85, & 379 (1971) and 2: 845. 1971.

Recent collectors describe this plant as a weak tree, 5—6 m. tall, and have found it growing in forests, montane or cloud forests, and cutover cloud forests, at 1400 to 1600 meters altitude, in fruit in January and March.

Additional & emended citations: GUATEMALA: Alta Verapaz: Türckheim 4013 (F—633315—photo of type, W—1323289—isotype, W—1323290—isotype, W—1323291—type); Williams, Molina R., Williams, & Molina 40143 (N). NICARAGUA: Matagalpa: Molina R. 20573 (N); Williams, Molina R., Williams, Gibson, & Laskowski 27757 (N).

**AEGIPHILA FENDLERI** Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 13: 324—325. 1966; Moldenke, Résumé Suppl. 16: 5. 1968; Moldenke, Fifth Summ. 1: 121 & 145 (1971) and 2: 845. 1971.

Recent collectors describe the pubescence on this plant as ferruginous and the leaf-blades as membranous, dull-green above and pale-green beneath, and have found the plant growing at altitudes of 1200—2130 meters, blooming in November.

Additional & emended citations: VENEZUELA: Aragua: Chardon 189 (W—1801130). Yaracuy: Steyermark, Bunting, & Wessel-Boer 100229 (N, Rf).

**AEGIPHILA FERRUGINEA** Hayek & Spruce ex Hayek in Engl., Bot. Jahrb. 42: 171. 1909 [not *A. ferruginea* Glaz., 1911].

Synonymy: *Aegiphila ferruginea* Hayek ex Moldenke, Suppl. list Invalid Names [1], in syn. 1941.

Additional & emended bibliography: Prain, Ind. Kew. Suppl. 4, pr. 1, 5 (1913) and pr. 2, 5. 1958; Moldenke, Phytologia 13: 325. 1966; Moldenke, Fifth Summ. 1: 134 & 379 (1971) and 2: 845. 1971.

Additional & emended citations: ECUADOR: Azuay: Asplund 17761 (N). Carchi: Mexia 7446 (Ar—14031). Chimborazo: Rimbach 616 (F—839581). Imbabura: F. C. Lehmann 4700 (F—578233, W—1323293). Pichincha: Firmin 632 (F—615718—photo, W—1440698); Penland & Summers 939 (F—1015427); Spruce 5473 (F—642207—photo of isotype, F—686830—isotype, F—868893—isotype).

**AEGIPHILA FILIPES** Mart. & Schau.

Additional synonymy: *Aegiphila filipes* Mart. ex Schau. in Mart., Fl. Bras. 9: 286. 1851. *Aegiphila filipes* Mart. & Zucc. ex Moldenke, Phytologia 4: 353, in syn. 1953.

Additional & emended bibliography: Schau. in Mart., Fl. Bras. 9: 286 & [309—310]. 1851; Jacks. in Hook. f. & Jacks., Ind. Kew.,

pr. 1, 1: 46. 1893; Moldenke, Brittonia 1: 247, 252, 272, 366—368, 371, 384, 389, 395, 428, 473, & 475—477. 1934; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 46 (1946) and pr. 3, 1: 46. 1960; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 703, 708, 709, 712, 716, & 720. 1960; Moldenke, Phytologia 13: 325 & 332. 1966; Moldenke, Résumé Suppl. 16: 5 (1968) and 17: 2. 1968; Moldenke, Fifth Summ. 1: 89, 114, 121, 138, 145, 181, 379, & 381 (1971) and 2: 845. 1971.

Recent collectors describe this plant as a liana or a slender shrub, 2.5—3 m. tall, the leaves papery, pale-green, slightly glossy above, dull beneath, the calyx pale-green, and the fruit yellowish-green or yellow when young, red when ripe. They have found it growing on terra firma and in moist sites with low vegetation, at 1850 meters altitude, flowering in November, and fruiting in April and November (in addition to months previously reported by me). The variant vernacular name, "chirapa sachá", is also recorded. The corollas are said to have been "white" on F. R. Fosberg 29039 and Prance, Coêlho, Ramos, & Farias 7787 and "yellow" on Breteler 4081. A wood sample has been taken from the last-mentioned collection. Fosberg reports that the species is "said to be used medicinally" and that his specimen was collected from "garden fence sticks that took root".

Macbride (1960) cites Asplund 14111, Killip & Smith 26882, Tessmann 3705, and Ll. Williams 533, 2469, 2622, 2850, 2856, and 8190 from Loreto, Peru, and gives the overall distribution of the species as "To Panama and Bolivia; Brazil". The J. A. Duke 4114, cited below, was previously incorrectly distributed as and reported by me as A. martinicensis Jacq. The Dodson 2834 & 2881, distributed as A. filipes, are actually A. glandulifera Moldenke, while Romero Castañeda 5430 is a species of Cestrum in the Solanaceae.

Additional & emended citations: PANAMA: Darién: J. A. Duke 4114 (E—1772186). Panamá: P. C. Standley 26853 (W—1217295). COLOMBIA: Caquetá: Romero Castañeda 4123 (N). Huila: Pérez Arbeláez & Cuatrecasas 8360 (W—1795002). Magdalena: H. H. Smith 1831 (D—509230, E—117694, F—138678, W—533752, Ws). VENEZUELA: Trujillo: Breteler 4081 (N, W—2466260, W—2466261). PERU: Loreto: F. R. Fosberg 29039 (Z); Killip & Smith 26882 (W—1460709); Ll. Williams 533 (F—603696), 2165 (F—608788), 2469 (F—608615), 2622 (F—612910), 2778 (F—608716), 2832 (F—608766), 2850 (F—608782), 2856 (F—608195), 3115 (F—613033), 3146 (F—613044), 8190 (F—626824). BRAZIL: Acre: Prance, Coêlho, Ramos, & Farias 7787 (Ac, N). Amazonas: Ducke 6735 (W—1040344); Krukoff 5125 (Ca—606303, F—811000), 8041 (F—928927), 8042 (F—930025); Spruce 1761 (F—686541). Pará: Martius s.n. [Macbride photos 20350] (F—684157—photo of cotype). BOLIVIA: El Beni: H. H. Rusby 2472 (W—1323301).

AEGIPHILA FLORIBUNDA Moritz & Moldenke

Synonymy: Aegiphila floribunda Moldenke apud Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941.

Additional & emended bibliography: Moldenke, Brittonia 1: 271, 272, 371—374, & 473—475. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 13: 325. 1966; Moldenke, Résumé Suppl. 16: 5. 1968; Moldenke, Fifth Summ. 1: 121 (1971) and 2: 786 & 845. 1971; Moldenke, Phytologia 25: 228 & 235. 1973.

Steyermark and his associates describe this plant as a tree, 3 meters tall, the leaves membranous, rich-green above, dull-green beneath, the pedicels pale-green, and the corolla creamy-yellow. They found it growing at 1750—1800 m. altitude, flowering in August. Local botanists identified it as possibly A. laxiflora Benth.

The Breteler 3921, cited below, is placed here only tentatively. The United States National Herbarium specimen of this collection is in very young bud and is therefore very difficult to place with any certainty. According to the collector's label, the plant was in full bloom at the time of collection, so it is hoped that I may eventually see better material of the collection and then verify or disprove the present identification. Breteler describes the plant as a shrub, 2 m. tall, slightly straggling in habit, the leaves papery, slightly glossy, medium-green above, paler beneath, with glands along the midrib, the calyx pale-green, and the corolla yellow, its tube about 8 mm. long. He found the plant growing in an open site along the edge of a rivulet, at 350 m. altitude, flowering in May.

Additional & emended citations: VENEZUELA: Aragua: Moritz 1765 (F—976283—photo). Barinas: Breteler 3921 (W—2465845). Lara: Steyermark, Delascio, Dunsterville, & Dunsterville 103520 (N, W—2621902).

AEGIPHILA FLUMINENSIS Vell.

Additional & emended synonymy: Aegiphyla fluminensis Arrab. apud Steud., Nom. Bot., ed. 2, 1: 29. 1840. Aegiphila fluminensis Arrab. apud Walp., Repert. Bot. Syst. 4: 120. 1845. Aegiphila fluminensis Sw. ex Bocq., Adansonia, ser. 1, 3: 190. 1862.

Aegiphila flumensis Vell. ex T. Peckolt, Bericht. Deutsch. Pharm. Gesell. 14: 478, sphalm. 1904. Aegiphila fluminensis Phil. ex Moldenke, Brittonia 1: 316, in nota. 1934; Prelim. Alph. List Invalid Names 2, in syn. 1940. Aegiphila fluminensis Vahl ex Moldenke, Brittonia 1: 316, in nota. 1934; Prelim. Alph. List Invalid Names 2, in syn. 1940.

Additional & emended bibliography: Schau. in Mart., Fl. Bras. 9: 283 & [309--310]. 1851; Bocq., Rév. Verbenac. 190. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46. 1893; T. Peckolt, Bericht. Deutsch. Pharm. Gesell. 14: 478. 1904; Glaz., Bull. Soc. Bot. France 58 [ser. 4, 11], Mém. 3: 546. 1911; Jacks. in Hook. f.

& Jacks., Ind. Kew., pr. 2, 1: 46 (1946) and pr. 3, 1: 46. 1960; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 711 & 717. 1960; Angely, Fl. Anal. Paran., ed. 1, 579. 1965; Moldenke, Phytologia 13: 325. 1966; Moldenke, Résumé Suppl. 16: 14. 1968; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 826 & 1. 1970; Moldenke, Fifth Summ. 1: 145, 379, 382, & 384 (1971) and 2: 845. 1971.

Peckolt (1904) says of this plant: "Auf den Gebirgen des Staates Rio de Janeiro vorkommend, mit der Benennung Sabugueira do mato -- Wilder Flieder. Bis 3 m hoher Strauch mit kahlen, länglichen, langgespitzten, oberseits glänzend grünen, unterseits mattgrünen Blättern. Weisse Blüten in achselständigen vielblütigen Cymen. Frucht beerenartig, karmesinrot, von der Grösse einer Johannisbeere; ein beliebtes Fressen der Vögel. Blüten und Blätter sollen schweisstreibend wirken."

It should be noted that some, or even many or all, of the collections cited hitherto and herewith from Rio de Janeiro state may actually have come from what is now known as Guanabara, since their labels are mostly inscribed only "Rio de Janeiro" and one cannot be certain from this if the city itself (now Guanabara) or the surrounding state of that name is intended.

Additional & emended citations: BRAZIL: Bahia: Blanchet 1603 (F-686586). Guanabara: Guillemin 248 (P). Rio de Janeiro: Luschnath s.n. [Brasilia] (E-117682); L. Riedel 0,40 (F-605885); United States Exploring Exped. [Wilkes] s.n. [Rio de Janeiro] (W-44617).

AEGIPHILA FOETIDA Sw., Nov. Gen. & Sp. Pl. Prodr. 32 [as "Aegiphila foetida"]. 1788; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 259. 1789.

Additional & emended synonymy: Aegiphila foetida Sw., Nov. Gen. & Sp. Pl. Prodr. 32. 1788. Aegiphyla foetida Sw. apud Steud., Nom. Bot., ed. 2, 1: 29. 1840. Aegiphila pubescens W. Wright ex Moldenke, Phytologia 1: 202, in syn. 1937 [not A. pubescens Willd., 1840]. Aegiphila foetida Urb. ex Moldenke, Phytologia 7: 472, sphalm. 1961.

Additional & emended bibliography: Sw., Nov. Gen. & Sp. Pl. Prodr. 32. 1788; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 259 (1789) and pr. 2, 2: 259. 1796; Roem. & Schult. in L., Syst. Veg., ed. 15 [Stuttg.], 3: 102 & [535]. 1818; Steud., Nom. Bot. Phan., ed. 1, 16. 1821; Paxt., Pock. Bot. Dict., ed. 1, 8 (1840) and ed. 2, 8. 1849; Bocq., Rév. Verbenac. 190. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46. 1893; Moldenke, Brittonia 1: 254, 264, 357-359, 472, 473, 475, & 476. 1934; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 46 (1946) and pr. 3, 1: 46. 1960; Moldenke, Phytologia 7: 472-473. 1961; Moldenke, Résumé Suppl. 14: 5 (1966) and 16: 14. 1968; Moldenke, Fifth Summ. 1: 99, 377, 379, 382, & 384 (1971) and 2: 845. 1971; C. D. Adams, Flow. Pl. Jam. 634-635 & 800. 1972.

Adams (1972) describes this plant as "Rare....in woodland on limestone; 1500-2000 feet" altitude, fruiting in January, "endem-

ic". He cites Alexander Prior s.n., Howard & Proctor 15047, and Proctor 23967 from Jamaica.

Emended citations: JAMAICA: Alexander Prior s.n. [Jamaica, 1850] (E--862842, F--642214--photo, W--1048216, W--1048352); Swartz s.n. (F--633325--photo of type).

#### AEGIPHILA FROESI Moldenke

Additional bibliography: E. J. Salisb., Ind. Kew. Suppl. 11: 5. 1953; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 706. 1960; Moldenke, Phytologia 7: 473. 1961; Moldenke, Fifth Summ. 1: 145 (1971) and 2: 845. 1971.

Prance and his associates describe this plant as a shrub, 1 m. tall, with cream-colored flowers, and found it growing on varzea land, flowering in April. It has been misidentified and distributed in some herbaria as Boraginaceae.

Additional citations: BRAZIL: Acre: Prance, Maas, Kubitzki, Steward, Ramos, Pinheiro, & Lima 12505 (Z).

#### AEGIPHILA GLABRATA Moldenke

Additional bibliography: Moldenke, Brittonia 1: 186--187. 1932; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 569. 1941; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 702, 703, & 708--709. 1960; Moldenke, Phytologia 13: 325--326. 1966; Moldenke, Fifth Summ. 1: 138 (1971) and 2: 845. 1971.

Macbride (1960) affirms that this species is probably related to A. martinicensis Jacq. and A. filipes Mart. & Schau. He cites only Asplund 12335 from Huánuco and Killip & Smith 25503 from Junín, Peru.

Additional & emended citations: PERU: Junín: Killip & Smith 25503 (F--607716--isotype, W--1359699--type). Loreto: Wurdack 2390 (N).

#### AEGIPHILA GLANDULIFERA Moldenke

Additional & emended bibliography: Moldenke, Brittonia 1: 187--188 (1932) and 252, 269, 272, 364--366, 368, & 472--477. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568 & 569. 1941; Cuatrecasas, Revist. Acad. Colomb. Cienc. 10: 232. 1958; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 703 & 709. 1960; Moldenke, Phytologia 13: 326 & 334. 1966; Acosta-Solis, Divis. Fitogeogr. Ecuad. 112. 1968; Moldenke, Résumé Suppl. 16: 5 (1968) and 17: 2. 1968; El-Gazzar & Wats., New Phytol. 69: 483 & 485. 1970; Gibson, Fieldiana Bot. 24 (9): 172. 1970; Moldenke, Fifth Summ. 1: 86, 89, 114, 121, 134, 139, 145, & 379 (1971) and 2: 845--846. 1971; Moldenke, Phytologia 23: 417 (1972) and 25: 235. 1973.

Recent collectors describe this plant as an "herb, 1 m. tall", shrub, or even a tree, 2--10 m. tall, the trunk 60 dm. in diameter at breast height, and the fruit as yellow or orange. The leaves on the Tyson collection, cited below, are definitely punctate be-

neath. Collectors have found the plant growing in secondary tropical rainforests and "infrequent in capoeira", while Cuatrecasas (1958) refers to it as a denizen "en selva neotropical inferior". It has been found in flower in May, July, and August, and in fruit in September and November (in addition to months previously reported by me), growing at altitudes of 100--1000 meters. The corollas are described as having been "white" on Dodson 2834, Romero Castañeda 4212, and Tyson 2213, "greenish-white" on Scolnik 1150, "yellowish-white" on A. Fernandez 293, "yellow" on Wedel 2517, and "pale-green" on Murça Pires & Cavalcante 52546. Macbride (1960) cites Klug 3016 and Tessmann 3508 from Loreto, Peru, records the vernacular name "chirapasacha", and gives the overall distribution of the species as "To Costa Rica; Brazil". Gibson (1970) reduces the species to synonymy under the West Indian A. martinicensis Jacq., to which it is certainly related.

Material of A. glandulifera has been misidentified and distributed in some herbaria under the names A. martinicensis Jacq., A. panamensis Moldenke, A. paniculata Moldenke, and Aegiphyla pendula Moldenke.

Additional & emended citations: PANAMA: Bocas del Toro: Wedel 2517 (E--1240406, W--1892669). Canal Zone: H. Pittier 6519 (W--716582); Tyson 2213 (E--1817320). COLOMBIA: Antioquia: Woronow & Juzepczuk 4433 (F--605670). Caquetá: Romero Castañeda 4212 (N). Chocó: Archer 2057 (W--1519120); A. Fernandez 293 (N). Santander: Dawe 472 (W--1423256--type); Haught 1629 (W--1592096). VENEZUELA: Táchira: Berti 2047 (Ac). ECUADOR: Esmeraldas: Sparre 18105 (S). PERU: Loreto: Dodson 2834 (W--2587002), 2881 (W--2587003). BRAZIL: Amapá: Murça Pires & Cavalcante 52546 (N).

#### AEGIPHILA GLANDULIFERA var. PARAENSIS Moldenke

Synonymy: Aegiphila gracilis Moldenke, Alph. List Invalid Names Suppl. 1: [1], in syn. 1947.

Additional & emended bibliography: Moldenke, Brittonia 1: 269, 272, 366, 472, & 474. 1934; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 13: 326. 1966; Moldenke, Fifth Summ. 1: 145 & 379 (1971) and 2: 845. 1971.

Emended citations: BRAZIL: Pará: Ginzberger 208 (F--934878); Killip & Smith 30661 (W--1356337--type); Krukoff 5923 (F--873477).

#### AEGIPHILA GLANDULIFERA var. PYRAMIDATA L. C. Rich. & Moldenke

Synonymy: Aegiphila pyramidata L. C. Rich. ex Moldenke, Phytologia 1: 204, in textu. 1937 [not A. pyramidata L., 1940].

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 5. 1947; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 709. 1960; Moldenke, Phytologia 7: 474. 1961; Moldenke, Fifth Summ. 1: 114, 121, 133, 145, & 382 (1971) and 2: 846. 1971; Moldenke, Phytologia 25: 235. 1973.

The A. pyramidata credited to Linnaeus (although never published by him) is a synonym of A. martinicensis Jacq.

#### AEGIPHILA GLEASONII Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Van Steenis, Fl. Males. 1: 194. 1950; Moldenke, Phytologia 7: 474. 1961; Moldenke, Fifth Summ. 1: 128 (1971) and 2: 846. 1971.

#### AEGIPHILA GLOMERATA Benth., Bot. Voy. Sulph. 154. 1846.

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46 (1893), pr. 2, 1: 46 (1946), and pr. 3, 1: 46. 1960; Moldenke, Phytologia 13: 326. 1966; Moldenke, Fifth Summ. 1: 134 & 137 (1971) and 2: 846. 1971.

Additional & emended citations: ECUADOR: Guayas: Asplund 15355 (N). Manabi: Eggers 15088 (F—143362, W—1323310).

#### AEGIPHILA GLORIOSA Moldenke

Additional & emended bibliography: Moldenke, Brittonia 1: 259, 277, 280, 449—450, 472, & 475. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 5: 152 (1955) and 7: 475. 1961; Moldenke, Fifth Summ. 1: 145 (1971) and 2: 846. 1971; Moldenke, Phytologia 23: 314 & 418. 1972; Moldenke, Biol. Abstr. 54: 3421. 1972; Anon., Biol. Abstr. 54 (7): B.A.S.I.C. S.8. 1972.

Additional & emended citations: BRAZIL: Bahia: Blanchet 1998 (F—686587—isotype). MOUNTED ILLUSTRATIONS: Moldenke, Phytologia 2: 437, fig. 2. 1948 (N—drawing).

#### AEGIPHILA GLORIOSA var. PARAËNSIS Moldenke, Phytologia 23: 314. 1972.

Bibliography: Moldenke, Phytologia 23: 314 & 418. 1972; Moldenke, Biol. Abstr. 54: 3421. 1972; Anon., Biol. Abstr. 54 (7): B.A.S.I.C. S.8. 1972.

Citations: BRAZIL: Pará: Silva & Souza 2253 (N—isotype, Z—type).

#### AEGIPHILA GOELDIANA Huber & Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 7: 475. 1961; Moldenke, Fifth Summ. 1: 145 (1971) and 2: 846. 1971.

Emended citations: BRAZIL: Pará: Goeldi 8166 (F—601931—isotype).

#### AEGIPHILA GOUDOTIANA Moldenke

Bibliography: Moldenke in Fedde, Repert. Spec. Nov. 33: 124—125. 1933; Moldenke, Brittonia 1: 262, 263, 282—283, & 473. 1934; Moldenke, Phytologia 1: 200 & 224. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Moldenke, Geogr. Distrib. Avicenn. 18. 1939; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941;

Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 30 & 85. 1942; H. N. & A. L. Moldenke, Fl. Life 2: 62. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 58 & 175. 1949; Moldenke, Résumé 65 & 441. 1959; Moldenke, Fifth Summ. 1: 114 (1971) and 2: 792 & 846. 1971.

I strongly suspect that a re-examination of the type will show that this species is not verbenaceous; probably is a member of the genus Cordia in the Ehretiaceae.

#### AEGIPHILA GRANDIS Moldenke

Synonymy: Aegiphila guyanensis Moldenke, Phytologia 1: 205, syn. in textu. 1937 [not A. guianensis Moldenke, 1933].

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 13: 326. 1966; Moldenke, Fifth Summ. 1: 114, 121, & 379 (1971) and 2: 846. 1971.

López-Figueira & Rodríguez describe this plant as "Arbol 8--12 m de alto, 15 cm de diámetro DAP; ramificación en el 1/3 superior. Ramas jóvenes subtetrágonas, pubescentes. Hojas simples, opuestas, su coriáceas, verde claro por la haz, más pálidas por el envés, pecioladas, pubescentes. Inflorescencias axilares solitarias; cáliz hipocrateriforme, bilabiado; flores cremosas; fruto drupáceo, negro intenso" and collected it at 2500 meters altitude.

Dr. López-Palacios informs me in a personal communication that the Venezuelan material hitherto regarded as this species uniformly has 4-lobed corollas and 4 stamens and therefore may well represent another species which he is naming in a paper now in press.

Additional & emended citations: COLOMBIA: Cundinamarca: Mutis 2335 (W--1562074), 3657 (W--1560048), 4554 (W--1560063), 4555 (W--1560064).

#### AEGIPHILA GRAVEOLENS Mart. & Schau.

Synonymy: Aegiphila tetragona Mart. ex Moldenke, Phytologia 1: 205, in syn. 1937. Aegiphila graveolens Schau. & Mart. ex Moldenke, Suppl. List Invalid Names [1], in syn. 1941. Aegiphila graveolens Mart. & Schum. ex Moldenke, Phytologia 2: 395, in syn. textu. 1947. Aegiphila graveolens Mart. ex Moldenke, Phytologia 4: 354, in syn. 1953.

Additional & emended bibliography: Schau. in Mart., Fl. Bras. 9: 284, 285, & [309--310]. 1851; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46 & 47. 1893; T. Peckolt, Bericht. Deutsch. Pharm. Gesell. 14: 478. 1904; Moldenke, Brittonia 1: 254, 259, 265, 304--305, 312, 313, 472, & 474--476. 1934; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 46 & 47. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 5. 1947; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 46 & 47. 1960; Moldenke, Phytologia 13: 326. 1966; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 826 & i. 1970; Moldenke, Fifth Summ. 1: 145, 379, & 383 (1971) and 2:

846 & 968. 1971; Moldenke, *Phytologia* 25: 235. 1973.

Peckolt (1904) records this species from the additional Brazilian state of Minas Gerais and says "Volksname (wie mehrerer unangenehm riechender Pflanzen verschiedener Familien): Catinga de bode — Bocksgestank. Die unangenehm riechenden Blätter dieses Bäumchen gestossen also Umschlag bei Erysipelas. Das Dekokt als Waschung gegen Flechten and zu Bädern bei Rheumatismus".

#### AEGIPHILA GUIANENSIS Moldenke

Synonymy: *Aegiphila arborea* Spruce ex Moldenke, *Phytologia* 1: 206, in syn. 1937. *Aegiphila guianensis* Aristeguieta ex Moldenke, Fifth Summ. 1: 379, in syn. 1971.

Additional & emended bibliography: Moldenke, *Brittonia* 1: 268, 340—341, & 474—476. 1934; A. W. Hill, *Ind. Kew. Suppl.* 9: 6. 1938; Fedde & Schust. in Just, *Bot. Jahresber.* 60 (2): 568. 1941; Hill & Salisb., *Ind. Kew. Suppl.* 10: 5. 1947; Moldenke, *Phytologia* 13: 326—327. 1966; Moldenke, Fifth Summ. 1: 114, 121, 128, 145, 378, & 379 (1971) and 2: 846. 1971.

Recent collectors describe this species as a common shrubby tree, 8—10 m. tall, branched near the base, with a large crown, the bark fissured, the leaves papery, dull pale-green or medium-green above, paler beneath, the calyx pale-green, persistent, the fruits ovoid-ellipsoid, orange-red, smooth, slightly glossy, 1-seeded, the pulp orange, and the seeds pale-brown, growing in secondary regrowth at altitudes of 280—1000 meters, flowering in July, August, and October. The corollas are said to have been "whitish" on *Aristeguieta* 3272 and *López-Palacios* 2992 and "white, pale-green at base" on *Breteler* 4512. *López-Palacios* describes the species as "arbol hasta de 12 m., de tallos griseos, los viejos algo fisurados, que se encuentran en terreno disturbado entre los 600 y 1200 m. Hojas hasta de 45 y más cm. Muestra con sólo cálices viejos". The plant represented by his no. 2992 he describes as an "Arbolito ca. de 8 m. Inflorescencias cimosas axilares".

Material has been misidentified and distributed in some herbaria as *A. integrifolia* (Jacq.) Jacks., which it closely resembles and to which the species is certainly closely related.

Additional citations: VENEZUELA: Apure: *Steyermark*, *Bunting*, & *Blanco* 101793 (Ve). Barinas: *Aristeguieta* 3272 (N); *Breteler* 4182 (N, W—2465370), 4512 (N, W—2466144); *López-Palacios* 2749 (Rf). Mérida: *López-Palacios* 2992 (Ld).

#### AEGIPHILA HASSLERI Briq.

Synonymy: *Aegiphila hassleriana* Briq. ex Moldenke, *Brittonia* 1: 308, in textu. 1934; Prelim. Alph. List Invalid Names 2, in syn. 1940; Michalowski, *Serv. Tecn. Interam. Coop. Agr. Bol.* 189. 1955. *Aegiphilla hassleri* Briq. ex Moldenke, *Phytologia* 4: 390, in syn. 1953. *Aegiphila hassleri* Briq. ex Moldenke, *Phytologia* 4: 390, in syn. 1953.

Additional & emended bibliography: Briq. in Chod. & Hassler,

Bull. Herb. Boiss., sér. 2, 4: 1167--1168. 1904; Michalowski, Serv. Tecn. Interam. Coop. Agr. Bol. 189. 1955; Rambo, Sellowia 7: 207. 1956; Angely, Fl. Anal. Paran., ed. 1, 579. 1965; Teague, Anal. Mus. Hist. Nat. Montev., ser. 2, 7 (4): 44. 1965; Moldenke, Phytologia 13: 327. 1966; El-Gazzar & Wats., New Phytol. 69: 483 & 485. 1970; Reitz, Sellowia 22: 8. 1970; Moldenke, Fifth Summ. 1: 145, 184, 188, 194, 354, 378, & 379 (1971) and 2: 846. 1971.

Recent collectors describe this species as a shrub, 2.5--3 m. tall, or a small tree, to 4 m. tall, the fruit fleshy, yellowish or cream-yellow, and have found it growing in thickets, in woodlands, along roadsides, and in sandy soil at the edge of woodlands, at altitudes of 180--250 meters, flowering from August to October, fruiting in January, March, May, and December. Montes says of it: "pl. arbusto caducifolio, altura 2.5 m., frutos amarillos cremosos, habitat en matorral denso, lugar alto, escaso". Krapovickas and his associates encountered the plant in "claro en isleta de selva" in Corrientes.

The corollas are said to have been "yellow" on Pedersen 5226 and "yellowish" on Pedersen 9252. The vernacular names, "casita" and "oreja de venado", are reported. Teague (1965) affirms that the wood is used for making boxes, clogs, and cheap furniture.

Material has been misidentified and distributed in some herbaria as A. brachiata Vell. and A. riedeliana Schau.

Additional & emended citations: BRAZIL: Paraná: Lindeman & Haas 534 (N). Rio Grande do Sul: O. Camargo 881 [Herb. Anchieta 59493] (B), 2037 [Herb. Anchieta 62037] (B), 2284 [Herb. Anchieta 62529] (B); Rambo 49479 (B). Santa Catarina: Smith & Reitz 12751 (N). PARAGUAY: Hassler 3193 (F--686670--cotype); Pedersen 3127 (N), 5226 (N); G. W. Teague 528 (Ws). URUGUAY: Arechavaleta 43 (F--686781). ARGENTINA: Corrientes: Krapovickas, Cristóbal, Arbo, Maruffak, Maruffak, & Irigoyen 16879 (Ws); Pedersen 9252 (N). Misiones: J. E. Montes 14784 (N), 14824 (Au, N, N); G. J. Schwarz 1601 (N), 4849 (N).

#### AEGIPHILA HASTINGSIANA Moldenke

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 5. 1947; Moldenke, Phytologia 7: 477. 1961; Gibson, Fieldiana Bot. 24 (9): 170--172. 1970; Moldenke, Fifth Summ. 1: 78 (1971) and 2: 846. 1971.

#### AEGIPHILA HAUGHTII Moldenke

Additional bibliography: E. J. Salisb., Ind. Kew. Suppl. 11: 5. 1953; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 703 & 710. 1960; Moldenke, Phytologia 7: 477. 1961; Moldenke, Fifth Summ. 1: 134 & 139 (1971) and 2: 846. 1971; Moldenke, Phytologia 23: 417. 1972.

Schunke describes this species as a shrub, 1--2 m. tall, the leaves pale-green, the sepals and peduncles "de color pardo rojizo", and the immature fruit blue-green. He found the plant growing in high forests, fruiting in January.

Additional citations: PERU: San Martín: Schunke V. 4648 (N).

**AEGIPHILA HERZOGII** Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 13: 327. 1966; Moldenke, Fifth Summ. 1: 181 (1971) and 2: 846. 1971.

Paredo encountered this plant at 425 meters altitude, flowering in April. The corollas are said to have been "yellow" on Paredo 514.

Additional & emended citations: BOLIVIA: Santa Cruz: Paredo 514 (N); J. Steinbach 3259 (B, F-552945, Z--photo).

**AEGIPHILA HIRSUTA** Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 703 & 710. 1960; Moldenke, Phytologia 7: 477. 1961; Moldenke, Fifth Summ. 1: 181 (1971) and 2: 846. 1971.

Macbride (1960) asserts that this species "no doubt" occurs in Peru, but he cites no substantiating specimens. He affirms that it "Ex char. resembles A. ovata but (on the basis of a single collection) internodes 5--6 cm. long in contrast to 7.5--14.5 cm., petioles about 5 mm. long, leaves more oblong, 6.5--13.5 cm. long, 2.5--5 cm. wide, lustrous, secondary nerves 8--11 pairs, peduncles about 4 cm. long, inflorescence apparently only terminal, 11.5 cm. long, 4 cm. wide; however, the inflorescence of A. ovata was imperfectly known, and according to the author the type of A. hirsuta was far too immature to permit accurate measurements of floral parts."

Emended citations: BOLIVIA: La Paz: Buchtien 1715 (W-1399499--type).

**AEGIPHILA HIRSUTA** var. **COLOMBIANA** Moldenke

Additional bibliography: J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 710. 1960; Moldenke, Phytologia 7: 478. 1961; Moldenke, Fifth Summ. 1: 114 (1971) and 2: 846. 1971.

Macbride (1960) says "The var. colombiana Mold....., from Putumayo near Peru is of course more widely distributed, but the tree may be referable to A. ovata Mold., the apparent differences certainly within the range of expected variation."

**AEGIPHILA HIRSUTISSIMA** Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 13: 327 & 334. 1966; Moldenke, Résumé Suppl. 16: 3. 1968; Moldenke, Fifth Summ. 1: 89, 114, & 121 (1971) and 2: 846. 1971; Moldenke, Act. Bot. Venez. 6: 94. 1972.

Duke and Bristan describe this plant as a small tree, with soft wood and green fruit.

Additional & emended citations: PANAMA: San Blas: Duke & Britton 351 (Oh). COLOMBIA: Chocó: Killip & García 33563 (W—1770487). VENEZUELA: Miranda: H. Pittier 8257 (W—988357—type, W—988358—isotype).

AEGIPHILA HOEHNEI Moldenke ex Hoehne, Resen. Hist. Secc. Bot. Agron. Inst. Biol. S. Paulo 153, hyponym. April 1937; Moldenke, Phytologia 1: 224—226. June 14, 1937.

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 5. 1947; Moldenke, Phytologia 7: 478. 1961; Moldenke, Résumé Suppl. 16: 3 & 4. 1968; Moldenke, Fifth Summ. 1: 145 (1971) and 2: 846. 1971.

Hill & Salisbury (1947) regard Hoehne's original publication of this binomial as a nomen nudum, but he clearly cites the type collection, so the name is actually a hyponym at that point.

AEGIPHILA HOEHNEI var. PUYENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 7: 478. 1961; Moldenke, Fifth Summ. 1: 134 (1971) and 2: 846. 1971.

Additional citations: ECUADOR: Napo-Pastaza: Asplund 19426 (N).

AEGIPHILA HOEHNEI var. SPECTABILIS Moldenke

Additional bibliography: Moldenke, Phytologia 7: 478. 1961; Moldenke, Résumé Suppl. 16: 3 & 4. 1968; Moldenke, Fifth Summ. 1: 89 & 114 (1971) and 2: 846. 1971.

Recent collectors describe this plant as a vine or sprawling shrub, 7 feet tall, with dull-yellow fruit, and have found it growing in forests at 2700—3100 feet altitude, flowering in July and August, and fruiting in January. The corollas are said to have been "white" on S. M. V. Hayden 1003 and "yellow" on Tyson, Dwyer, & Blum 4342. The plant bears striking resemblance to A. cordata var. colombiana Moldenke. Material has been misidentified and distributed in some herbaria under the names A. cephalophora Standl. and "A. cephalophora Moldenke".

Additional citations: PANAMA: Panamá: Dwyer & Gentry 9456 (N); S. M. V. Hayden 1003 (E—1893974, W—2545870); Tyson, Dwyer, & Blum 4342 (E—1844296, Z).

AEGIPHILA HOFFMANNIOIDES Standl. & Steyermark.

Additional & emended bibliography: Standl. & Steyermark, Field Mus. Publ. Bot. 23: 227—228. 1947; E. J. Salisb., Ind. Kew. Suppl. 11: 5. 1953; Moldenke, Phytologia 4: 381. 1953; Moldenke, Fifth Summ. 1: 78 (1971) and 2: 846. 1971; Moldenke, Phytologia 23: 427. 1972.

It has recently been suggested that this species is actually not a member of the genus Aegiphila nor anything verbenaceous, but is conspecific with Hoffmannia lenticellata Hemsl. in the Rubiaceae. In a letter to me Dr. Steyermark assures me that he will re-investigate this matter and will report to me on it at a later date. Obviously, from the specific epithet chosen, he and Stand-

ley originally noted the resemblance to Hoffmannia but decided that the floral characters were those of Aegiphila. Certainly from what can be seen of the floral characters on a photograph of the type in the New York Botanical Garden herbarium, the characters resemble those of an Aegiphila far more than they do those of a Hoffmannia. We shall await Dr. Steyermark's report with interest.

#### AEGIPHILA INSIGNIS Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6 & 204. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 569. 1941; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 710—711 & 716. 1960; Moldenke, Phytologia 7: 478—479. 1961; Moldenke, Fifth Summ. 1: 139 (1971) and 2: 593 & 846. 1971.

Macbride (1960) asserts that this species is "in all probability" the same as A. pulcherrima Moldenke.

#### AEGIPHILA INTEGRIFOLIA (Jacq.) Jacks. in Hook. f. & Jacks., Ind.

Kew., pr. 1, 1: 46 & 386 [as "Jacq."]. 1893; Moldenke, Brittonia 1: 337. 1934.

Additional & emended synonymy: Callicarpa integrifolia Jacq., Enum. Syst. Pl. 12. 1760 [not C. integrifolia Champ., 1890, nor Forbes & Hemsl., 1932, nor L., 1772]. Manabea arborescens Aubl., Hist. Pl. Guian. 1: 64—65, pl. 24. 1775. Aegiphila arborescens Aubl. apud J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 259. 1789. Aegiphila arborescens Lam., Tabl. Encycl. Méth. Bot. 1: 294. 1792. Aegiphila arborescens Vahl, Eclog. Amer. 1: 15—16, pl. 10. 1796; Pers., Syn. Pl. 1: 132. 1805. Aegiphila arborescens Willd., Linn. Sp. Pl. 1: 616. 1797; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 3: 10. 1818. Callicarpa globiflora Ruiz & Pav., Fl. Peruv. & Chil. 1: 49—50, pl. 77b. 1798. Manabaea arborescens Aubl. apud Steud., Nom. Bot., ed. 1, 1: 16. 1821. Aegiphila arborescens H.B.K. apud Cham., Linnaea 7: 110, in textu. 1832. Aegiphila arborescens Vahl apud Steud., Nom. Bot., ed. 2, 1: 29. 1840. Callicarpa discolor Willd. ex Steud., Nom. Bot., ed. 2, 1: 29, in syn. 1840. Aegiphila arborescens f. breviflora Schau. in A. DC., Prodr. 11: 650. 1847. Aegiphila arborescens f. mascula ♀ breviflora Schau. in Mart., Fl. Bras. 9: 282. 1851. Aegiphila arborescens f. foemina ♀ breviflora Schau. in Mart., Fl. Bras. 9: 282. 1851. Aegiphila integrifolia Jacq. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46. 1893. Aegiphila arborescens (Aubl.) Vahl apud H. H. Rusby, Mem. Torrey Bot. Club 4: 245. 1895. Aegiphila arborescens (Aubl.) Gmel. apud Moldenke, Brittonia 1: 337, in syn. 1934. Aegiphila arborescens var. breviflora Schau. apud Moldenke, Brittonia 1: 337, in syn. 1934. Aegiphila arborescens Jacq. ex Moldenke, Brittonia 1: 337, in syn. textu. 1934; Prelim. Alph. List Invalid

Names [1], in syn. 1940. Aegiphylla discolor Willd. ex Augusto, Fl. Rio Grande do Sul 236. 1946. Aegiphylla integrifolia Jacq. ex Augusto, Fl. Rio Grande do Sul 236. 1946. Aegiphila arborescens Veloso, Mem. Inst. Oswaldo Cruz 44: 335. 1946. Aegiphila intermedia (Aubl.) Moldenke, Phytologia 4: 394, in obs. 1953 [not A. intermedia Moldenke, 1933]. Callicarpa globifera J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 711, sphalm. 1960. Manabca arborescens Aubl. apud J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 711, sphalm. 1960. Aegiphila integrifolia (Jacq.) Jack ex Rennó, Levant. Herb. Inst. Agron. Minas 149, sphalm. 1960. Aegiphylla integrifolia (Jacq.) Jacks. ex Moldenke, Résumé Suppl. 16: 14, in syn. 1968. Aegiphila integrifolia (Jacq.) Jacq. apud Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 827. 1970. Aegiphila integrifolia "Jacq. ex Hook. & Jacks.", in herb.

Additional & emended bibliography: Jacq., Enum. Syst. Pl. 12. 1760; Jacq., Select. Stirp. Amer. Hist. 15, pl. 173. 1763; Aubl., Hist. Pl. Guian. 1: 64—65, pl. 24. 1775; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 246 & 259. 1789; Lam., Tabl. Encycl. Méth. Bot. 1: 294. 1792; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 2, 2: 246 & 259. 1796; Vahl, Eclog. Amer. 1: 15—16, pl. 10. 1796; Raeusch., Nom. Bot., ed. 3, 37. 1797; Willd., Linn. Sp. Pl. 1: 616 & 621. 1797; Ruiz & Pav., Fl. Peruv. & Chil. 1: 49—50 & 73, pl. 77b. 1798; Turton, Gmel. Gen. Syst. Nat. 5: 219. 1802; Pers., Syn. Pl. 1: 132. 1805; H. C. Andr., Bot. Rep. 9: 578. 1809; Poir., Encycl. Méth. Suppl. 1: 150 (1810) and 2: 33. 1811; Pers., Sp. Pl. 1: 339 & 342. 1817; H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: 203 (1817) and ed. quarto, 2: 251. 1818; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 3: 10, 95, 96, 101, & [535] (1818) and ed. 15 [Stuttg.], 3: 96 & 101. 1818; Steud., Nom. Bot. Phan., ed. 1, 16 & 137. 1821; Willd., Nom. Bot., ed. 2, 82. 1821; Kunth, Syn. Pl. 2: 43—44. 1823; Cham., Linnaea 7: 110. 1832; Benth., Ann. Nat. Hist. 2: 449. 1839; D. Dietr., Syn. Pl. 1: 429. 1839; Paxt., Pock. Bot. Dict., ed. 1, 8. 1840; Steud., Nom. Bot., ed. 2, 1: 29. 1840; Walp., Repert. Syst. Bot. 4: 122. 1845; Schau. in A. DC., Prodr. 11: 649. 1847; M. R. Schomb., Reisen Brit.-Guian. 3: [Vers. Fauna & Fl. Brit.-Guian.] 959 & 1150. 1848; Paxt., Pock. Bot. Dict., ed. 2, 8. 1849; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur. 3:] 504. 1850—1853; Schau. in Mart., Fl. Bras. 9: 281—282 & [309]—311. 1851; Griseb., Fl. Brit. W. Ind. 499. 1861; Bocq., Adansonia, ser. 1, 2: 109 & 154 (1862) and 3: 190, pl. 9, fig. 12—14. 1863; Bocq., Rév. Verbenac. 109, 154, 190, & 264, pl. 9, fig. 12—14. 1863; Pritz., Icon. Bot. Ind. 1: 23. 1866; Hereman, Paxt. Bot. Dict. 13. 1868; Warming, Symb. Fl. Bras. Cent. 23: 712. 1877; Hemsl., Biol. Cent. Am. 2: 538. 1882; Warming, Lagoa Santa 434. 1892; Donn. Sm., Bot. Gaz. 18: 7. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46 & 386 (1893) and pr. 1, 2: 160. 1894; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1895; H. H. Rusby, Mem. Torrey Bot. Club 4: 245. 1895; H. H. Rusby, Bull. Torrey Bot. Club 27: 81. 1900; T. Peckolt, Bericht.

Deutsch. Pharm. Gesell. 14: 478. 1904; Glaz., Bull. Soc. Bot. France 58 [ser. 4, 11], Mém. 3: 546. 1911; Usteri, Fl. Umgeb. Stadt São Paulo 228. 1911; Donn. Sm., Bot. Gaz. 57: 426. 1914; Herzog, Meded. Rijksherb. Leid. 29: 48. 1916; Stapf, Ind. Lond. 1: 79 & 526 (1929) and 4: 217. 1930; Junell, Symb. Bot. Upsal. 4: 82 & 83. 1934; Moldenke, Phytologia 1: 226—228 (1937) and 1: 292. 1938; Moldenke, Lilloa 4: 317. 1939; Moldenke, Phytologia 1: 390 (1940) and 2: 90. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 46 & 386 (1946) and pr. 2, 2: 160. 1946; H. P. Veloso, Mem. Inst. Oswaldo Cruz 44: 267 (1946) and 45: 22. 1947; Daniel, Verb. Cent. Antioq. 7. 1947; Moldenke, Phytologia 2: 397—398 (1947) and 2: 436. 1948; F. C. Hoehne, Ind. Bibl. Num. Pl. Col. Com. Rondon 346. 1951; Greig-Smith, Journ. Ecol. 40: 294 & 307. 1952; Moldenke, Inform. Mold. Set 54 Spec. [1]. 1956; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 46 & 386 (1960) and pr. 3, 2: 160. 1960; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 702, 705, & 711—712. 1960; Moldenke, Phytologia 13: 328, 336, 340, 428, & 476 (1966) and 14: 244 & 245. 1967; Moldenke, Résumé Suppl. 14: 6 (1966), 15: 4 (1967), and 16: 4 & 14. 1968; J. A. Steyerl., Act. Bot. Venez. 3: 156. 1968; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 827 & i, map 1368. 1970; Dennis, Kew Bull. Addit. Ser. 3: 258. 1970; Oberwinkler, Pterid. & Sperm. Venez. 9 & 78. 1970; Moldenke, Fifth Summ. 1: 89, 111, 114, 121, 128, 133, 134, 139, 145, 181, 354, 378, 380, & 384 (1971) and 2: 407—410, 570, & 846. 1971; Moldenke, Phytologia 22: 28, 281, & 290 (1971), 23: 427 (1972), and 25: 235, 236, & 241. 1973.

Illustrations: Vahl, Eclog. Amer. 1: pl. 10. 1796; Ruiz & Pav., Fl. Peruv. & Chil. 1: pl. 77b. 1798; Bocq., Adansonia, ser. 1, 3: [Rév. Verbenac.] pl. 9, fig. 12—14. 1863.

Recent collectors describe this plant as a shrub or vining shrub, 1—4 m. tall, or a small tree, 3—6.5 m. tall, with a trunk diameter to 5 cm., the wood light in weight, the stems square, the leaves papery or membranous, dull-green or dull pale-green, paler green beneath, the flowers fragrant, the calyx pale- or gray-green, the anthers brown, and the fruit red. They have found it growing in high woods and in secondary regrowth. The corolla is said to have been "white" on Schunke V. 1796, Stern, Chambers, Dwyer, & Ebinger 663, and Steyermark & Bunting 102796 and "dirty-white" on Breteler 4905. Macbride (1960) reports that the plant may be "Sometimes 12 meters tall, trunk 3 cm. in diameter, rough gray bark". He cites Sandeman 3676 and Scolnik 903 from Cuzco, Macbride 5053, Ruiz & Pavon s.n., and Spruce 1616 from Huánuco, Killip & Smith 26239 from Junín, Castelnau s.n., Klug 108, Schunke 343, and Ll. Williams 2052, 2328, 2583, & 2795 from Loreto, McCarroll 94 and Metcalf 30667 from Puno, and Klug 3468 from San Martín, Peru. He gives its overall distribution as "To Colombia, Bolivia and Trinidad". In addition to the months previously reported by me, the species has been collected in anthesis in April and December and in fruit in September.

Peckolt (1904) records this species from the additional Brazilian state of Alagôas, and records the vernacular names, "paó molle" and "paó de veretas", which he translates as "weiches Holz" and "Ladestockbaum". He comments that "Das weisse, leicht zu schnitzende Holz wird zu verschiedenen häuslichen Gerätschaften benutzt, die Zweige zu Ladestöcken, Ruten usw. Es ist mir nicht bekannt, ob die Art arzneilich benutzt wird." Lamarck (1792) calls it "aegiphile arborescent". His 1791 work is often cited as "Lam. Illustr. 1503", but that is using a subtitle and a species (not page) number.

Dennis (1970) records the fungus, Meliola cookeana var. aegiphilae (Stev.) Hansf., from this species as host.

It should be noted here that the H.B.K. reference dates given in the emended bibliography above have been authenticated by the late eminent botanical biographer and bibliographer, Dr. J. H. Barnhart (1902). The Lamarck (1792) reference is sometimes incorrectly cited as "Lam. Illustr. 2. p. 594." The species is not mentioned on that page.

Schauer (1847) plainly designates his two infraspecific taxa, "longiflora" and "breviflora", as forms (not varieties), saying "Flores diclini, magnitudine ac figura duplici forma obvi", even though he precedes the epithets with Greek letters. His f. breviflora is characterized by him as follows: "♂: Cal. 3 lin. longus. Cor. infundibularis, tubo calycem vix aequante vel paulo excedente, limbi laciniis lanceolatis 2 lin. longis reflexis. Stamina limbo sesquialongiora. ♀: Cal. turbinato-campan. 2 1/2 lin. long. Cor. calycem limbo exiguo superans, antheras tabescentes brevistipitatas infra fauces gerens. Stylus longe exsertus." In contrast, his f. longiflora [which I regard as A. bracteolosa Moldenke] is described as "♂: Cal. 4 fere lin. longus. Cor. tubo gracili 5—6 lin. metiente laciniis lanceolatis lineâ paulo longioribus reflexis. Stam. limbum duplo excedentia. Stylus inclusus. ♀: Cal. et cor. maris. Antherae abortivae, breviter stipitatae, fauci cor. inclusae. Stylus capillaris cruribus exsertis." In his 1851 work he modifies the description of the taxon only slightly, but reduces it to subform rank. He does not divide his specimen citations into the two infraspecific groups, citing merely for the species as a whole: Blanchet 2121 ["forma foliis subtus pube lanuginosa incanis"], Martius s.n. [Barra] and s.n. [Porto dos Miranhas], and Poeppig 1615 from Brazil, Schomburgk 404 from Guyana, Herb. Gen. Berol. s.n. from Trinidad, Humboldt & Bonpland s.n. from Venezuela, and Ruiz s.n. from Peru. Schomburgk 404 appears to be a mixture with A. guianensis Moldenke, while the two Martius collections are A. bracteolosa Moldenke.

The Callicarpa integrifolia Champ. and C. integrifolia Forbes & Hemsl., referred to in the synonymy above, are synonyms of C. integerrima Champ., while the homonym accredited to Linnaeus belongs in the synonymy of C. tomentosa (L.) Murr.

[to be continued]

## BOOK REVIEWS

Alma L. Moldenke

"PRINCIPLES AND TECHNIQUES IN PLANT VIROLOGY" edited by Clarence I. Kado and Hari O. Agrawal, xv & 688 pp., illus., Van Nostrand Reinhold Co., New York, N. Y. 10001. 1972. \$29.50.

The authors claim correctly that "the reader [student, teacher, researcher] is able first to obtain methods and concepts of inoculation and transmission of virus; then to understand the biological behavior of the virus; and finally to acquire the techniques for isolating, purifying, and characterizing the virus." To this end 25 writers, in addition to the editors, have presented carefully illustrated, explained and documented papers organized under the following four topics: (1) biology of plant viruses, (2) transmission of plant viruses by aphids, homopterans, eriophyid mites, nematodes, fungi, seeds and pollen, (3) isolation and characterization of viruses by centrifugation, electrophoresis, nucleic acid isolation and serology, and (4) photobiology and mutation.

This book is a well organized storehouse of much new information and has a very long bibliography.

"NORTHEASTERN TREES IN WINTER" by Albert Francis Blakeslee & Chester Deacon Jarvis, xxi & 264 pp., illus., Dover Publications, Inc., New York, N. Y. 10014. Facsimile Publication 1972. \$3.00 paperback.

The still very usable, delightfully inexpensive field book was first published in Bulletin 69 of the Storrs (Connecticut) Agricultural Experiment Station in 1911 and entitled "New England Trees in Winter". To it has been added a new table of changes in nomenclature by E. S. Harrar which updates the work from Gray's "Seventh Edition" to Little's "Check List of Native and Naturalized Trees of the United States". The over 400 photographs are well printed. The keys to 215 species are some of the clearest ever constructed. This book should be useful to students, naturalists, foresters and the ever growing diversified group of ecologists.

"MEDICAL MYCOLOGY MANUAL" 3rd Edition by E. S. Beneke & A. L. Rogers, viii & 226 pp., illus., Burgess Publishing Co., Minneapolis, Minnesota 55415. 1970. \$9.50 paperback.

This work has been quite widely and effectively used in good technology courses on the collegiate and related levels. The

new edition gives "new culture media, improved immunological methods, use of fluorescent antibody techniques, and methods for physiological differentiation" and excellent new color plates of the different types of dermatomycoses and dermatophytes and of colonies of Microsporium spp., Epidermophyton sp. and Trichophyton spp. Because of the increase in fungal diseases concomitant with antibiotic treatment of bacterial diseases and with chemotherapy of certain malignancies additional emphasis is put on the etiological agent and on such conditions as torulopsosis, streptotrichosis and keratomycosis.

Laboratory procedures are clearly explained. Literature is provided for each topic. Sources for media, equipment and culture are also given.

"THE VOYAGE OF THE CHALLENGER" by Eric Linklater, 288 pp., illus., Doubleday & Co., New York, N. Y. 1972. \$15.00.

"The objects of the Expedition have been fully and faithfully carried out", wrote Wyville Thomson. "We always kept in view that to explore the conditions of the deep sea was the primary object of our mission, and throughout the voyage we took every possible opportunity of making a deep-sea observation. Between our departure from Sheerness [Portsmouth] on December 7th, 1872, and our arrival at Spithead on May 24th, 1876, we traversed a distance of 68,890 nautical miles and at intervals as nearly uniform as possible we established 362 observing stations." He wrote the first two volumes of the report.

By 1895 John Murray had completed the oversized (royal quarto) fifty volume scientific report. From this material and other earlier written accounts of this voyage Eric Linklater has written this interesting account. The scientific interests are mainly oceanographic, then those of marine biology, and later those of geographic, botanical and anthropological nature.

Some of the interesting plants described are the floating seaweed, Macrocystis pirifera, off Inaccessible Island, the heavily vegetated Azorella selago on Marion Island, kelp around Kerguelen, the Eucalyptus amygdalina from Melbourne considered by the other ship's naturalist, Moseley, the tallest tree in the world, Erythrina indica on Fiji whose gorgeous scarlet blossoms in August indicate time for yam planting and starting the calendar afresh, the epiphytic Myrmecodia armata and Hydnophytum formicarum [species name misspelled] with essential stem-dwelling ant colonies as large as a man's head from the Moluccas, etc.

The book is copiously and effectively illustrated with copies of some of the original plates and with modern colored photographic prints. It should appeal to a wide variety of readers.

"CYTOPLASMIC GENES AND ORGANELLES" by Ruth Sager, xiv & 405 pp., illus., Academic Press, New York, N. Y. 10003. 1972. \$12.50.

For many students and researchers in various fields of genetics, cytology and biochemistry, this text by the American leader in this study will prove a great boon because of all the content collated, because of its clear exposition, because of all the literature references organized topically, and because of its analyses of problems for future study.

This work covers the cytoplasmic genes in Chlamydomonas, mitochondrial heredity in yeast, cytoplasmic genes in Neurospora, other fungi, higher plants (pollen sterile Zea mays, Pelargonium, Oenothera), preferential transmission and somatic segregation, and mitochondrial and chloroplast biogeneses. "The genetic analysis of cytoplasmic systems has revealed the presence of elaborate, well-integrated sets of cytoplasmic genes present in organelle DNAs that show great stability, permanence, and importance in survival and evolution of eukaryotic microbes and higher organisms."

"TIMBERLINE ANCIENTS", photography by David Muench and text by Darwin Lambert, 128 pp., illus., Charles H. Belding, Publisher, Portland, Oregon 97209. 1972. \$22.00.

Such a beautiful, beautiful revelation of nature and art with text and photographs glorifying each other! Once you see this book you will want it left on the library desk or coffee table so that it can be picked up for inspiration, information and repeated perusals by friends, family and self. The purchase price is indeed reasonable for this oversized excellent printing by Graphic Arts.

The text and the color prints effectively describe and depict these ancient bristlecone pines (Pinus aristata) in their high, arid, and cool habitat. The text also tells of the scientific researches on tree-ring dating establishing them as the oldest living trees with some dead wood 8,000 years old. The color prints illustrate them in their known localities in the United States — in the White Mountains and in the Panamint Range in California, on Charleston Peak and on Wheeler Peak in Nevada, in the Cedar Brakes and in Bryce Canyon in Utah, on Mount Evans in Colorado, and on the San Francisco peaks in Arizona.

Such an exquisitely beautiful work of skill and feeling by Muench and Lambert!

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1973

# PHYTOLOGIA

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# **CATALOGUS Euphorbiarum**

**1973**

**E. JABLONSKI**

**Vol. I-a**

**INTRODUCTION**

**BOISSIER'S SYSTEM**

**POST BOISSIER'S SYSTEM**

INTRODUCTION.

Boissier's monograph of the genus *Euphorbia* (1862) is over 100 years old.

A great deal of new material has been collected, and a great deal of new observations have been made since: in North America, tropical Africa, The Orient, and Central Asia.

Detailed studies of portions of the genus in geographically isolated areas have been made, but no new coherent review with species listed exists.

Below are listed the most important authors who did the most important additions to our knowledge to the System of *Euphorbia* genus on a world-wide basis, except F. Pax, who, however, followed Boissier very closely. The greatest progress was made by N. E. Brown.

<u>Müll. Arg.</u> in Fl. Brasiliensis	1874
<u>A. Berger</u> Sukkulente Euphorbien	1907
<u>N. E. Brown</u> Fl. Trop. Afr., Fl. Capensis	1915
<u>F. Pax</u> in Natürl Pflansen Fam. 2.Ed.	1931
<u>Degener</u> and <u>Croizat</u> in Fl. Havanensis	1938
<u>C. C. Wheeler</u> Subgen Chamaesyce	1941
<u>R. I. Prokhanov</u> in Komarov's Fl. SSSR	1949
<u>R. G. Meyer</u> in Merxmüller's Prodrömus	1967
<u>Grady Webster</u> , Genera of Euphorbiaceae	1967
<u>A. R. Smith</u> and <u>T. G. Tutin</u> in Fl. Europea	1968
<u>Hurusawa</u> - Japan	

All these authors were confined to Brasil, Africa, Succulents, Hawaii, Central Asia, German W. Africa, S.E.U.S., Fl. Europea.

By retaining Boissier's System one does not retain the best system, but the system that will necessitate the least overclassification, least name multiplication and the least promotion of botanical lawyers.

The best system would be the one expressing evolution. Such system would be based on paleontology. But paleontology doesn't work in botany. A few cases of amber conserved oligocene flowers too meager to base evolutionary speculations on them. No seed magnificent paleontological evidence exists in flowering botany like the system of vertebrates can boast with.

Boissier's system embraces the whole world and is based on minute study of morphology and does not stress evolution. One can be critical of Boissier's work in detail but when it comes to replace the whole

with a better one, one gets into trouble.

I will, therefore, retain Boissier's basic concepts as a working system by inverting the new taxonomic units between the old one; by adding rather than by replacing and destroying.

Another curse on the progress of Euphorbia classification is over stressing the importance of the problem of whether or not breaking Euphorbia into smaller genera. As if it would be of any importance or not if a portion of Euphorbia should be named differently than is done by a monographer "A monographer is always right, a non-monographer's criticism is superfluous".

Boissier's words: "Genus vastissimum et naturalissimum, ideo in sectiones recte definitas difficile distribuentum" -- Still holds.

So why create new problems and break a very natural group into several unnatural ones?

It requires no scientific justification.

American authors are divided into two groups. The first group, the conservationists want to leave it in the genus; L. C. Wheeler, A. Berger, Pax, Fernald, McVaugh. The progressives want to take Chamaesyce out of Euphorbia, and leave the rest of Euphorbia into the hands of other monographers; Croizat, Millspaugh, Webster, Degener, Dinter, Burch, Hurusawa, Skinner. The difficulty to define the genus exactly is great.

Only in one respect does my work pretend completeness. It will list all validly published binominals and trinominals, and insert them numerically as "post-Boissier binominals and trinominals".

An effort will be made to discuss all new systems and relationships, and geographic groupings where practical.

Modern taxonomy (experimental, cytological, chemotaxonomy, palinology) creates an amazing field for progress, but it is still too specialized and in very narrow avenues, and too slow to get forward.

The question whether or not to break Euphorbia into smaller genera is not an important question, and now occupies many botanists' valuable time unnecessarily. It is rather the question of taste than of scientific value. If one considers it really a scientific problem, then it should be treated world-wide. By treating it locally, one simply creates new problems which one leaves unresolved to others. It is a subjective dislike to large genera.

THE BOISSIER SYSTEM  
1862

I Series APPENDICULATAEA. Stipulatae

I	Sect. Anisophyllum	176	1	-176	Herbae, Frutice	Orbs. veter.
II	Sect. Zygophyllidium	4	177-180		Herbae	Amer.
III	Sect. Cyttarospermum	5	181-205		Herbae, Frutice	Amer.
IV	Sect. Dichilium	4	206-209		Herbae	Amer.
V	Sect. Alectrotonum	16	210-226		Frutices	Amer.
VI	Sect. Petaloma	2	227-229		Herbae	Amer.
VII	Sect. Crossadenia	4	230-234		Herbae v Frutices	Amer.
VIII	Sect. Stachidium	3	235-238		Herbae	Amer., Carpens.

B. Stipulae nullae

IX	Sect. Tithymalopsis	8	238-246		Herbae	Amer.
X	Sect. Tricherostigma	2	250-251		Frutices	Amer.
XI	Sect. Portulacastrum	2	252-253		Herbae	Amer.

II Series EXAPPENDICULATAEA. Stipulatae

XII	Sect. Cheirolepidium	1	-254		Herbae	Tatania
XIII	Sect. Eremophyton	2	255-257		Herb., Frutice	Austral.
XIV	Sect. Nummulariopsis	1	-258		Herbae	Amer.
XV	Sect. Poinsettia	10	259-269		Herb., Frutice	Amer.
XVI	Sect. Arthrothamnus	10	270-280		Frutices	Cape
XVII	Sect. Caulanthium	1	-281		Herba carnosae	India or.
XVIII	Sect. Goniostema	7	282-289		Frutices carnosae	Madag.
XIX	Sect. Diacanthium	33	290-323		Frutices carnosae	Madag., Arabia, India or., Abyss.

B. Stipulae nullae

XX	Sect. Euphorbium	33	324-357		Frutices carnosae	Cape
XXI	Sect. Rhizanthium	5	358-363		Herbae carnosae	Himal.
XXII	Sect. Tirucalli	14	364-378		Frutices subcarnosi	Cape
XXIII	Sect. Lyciopsis	1	-379		Frutex spinescens	Arab
XXIV	Sect. Pseudacalypha	2	380-382		Frutae, Herbae parvi	Arab.
XXV	Sect. Euphorbiastrum	1	-383		Frutex	Costa Rica
XXVI	Sect. Tithymalus	308	384-692		Herbae v Frutices non carnosae.	Toto orbe obviae.

The Boissier System is built on 26 sections, which are of very irregular size. The first and the last one are the biggest. The 24 sections are much smaller; some of which consist of only one species.

The first section ANISOPHYLLUM has 176 species, the last one TITHYMALUS has 692 species. In between the 24 sections altogether have only 206 species, but the variation here is the biggest. Herbs, shrubs, trees, succulents and dwarf plants alternating with each other.

ANISOPHYLLUM alone consists of 8 subsections, of which one CHAMAESYCE is dominating with 94 species.

TITHYMALUS consists of 11 subsections of which the 7th ESULA is dominating with 139 species.

The original work of Boissier was published in 1862, but in 1866 a Supplementum of 29 new species was added.

Boissier did not consider the succulents from an evolutionary standpoint of importance and scattered them over several sections of which XIX DIACANTHIUM and XX EUPHORBIUM became the most important.

A great number of specialists have done special work on succulents: Pax (1897-1910), Berger (1907) and N. E. Brown (1912, 1915).

Boissier's sections: XIX DIACANTHIUM, XX EUPHORBIUM, XXII TIRUCALLI, XXI RHIZANTHIUM - are not identified separately by N. E. Brown but are absorbed in his two very excellent keys in Fl. Trop. AFR (1912) and Flora Capensis (1915)

MÜLL. ARG. SYSTEM1874Fl. Bras.

48 Binominals and many trinominals.

This table refers to brasilian species only and follows Boissier's system very closely.

## A. Involucro praeter glandulas insuper appendices gerentia

Sect. I	<u>Ephedropeplus</u>	Mull.Arg.	1	(pp. Crossadonia Bois.) E.gymnodada Bois.
Sect. II	<u>Alectrotonum</u>	Boiss.	1862 1	E.cotinoides Miq.
Sect. III	<u>Anisophyllum</u>	Roeper	1828 22	
Sect. IV	<u>Cyttarospermum</u>	Boiss.	1862 2	
Sect. V	<u>Dichilium</u>	Boiss.	1862 1	E.insulana Vell.
Sect. VI	<u>Crossadenia</u>	Boiss.	1862 4	

## B. Involucrum appendicibus destituta

Sect. VII	<u>Nummulariopsis</u>	Boiss.	1862 1	E.peperomioides Boiss
Sect. VIII	<u>Euphorbium</u>	Boiss.	1862 1	E.phosphorea Mart.
Sect. IX	<u>Stachidium</u>	Boiss.	1862 1	E.comosa Vell.
Sect. X	<u>Poinsettia</u>	Boiss.	1862 3	
Sect. XI	<u>Tithymalus</u>	Boiss.	1862 11	

48 species.

THE BERGER, A. SYSTEM  
1907

		<u>Boissier Nos.</u>
Sect. 1	Tithymalus	410-427
2	Arthrothamnus	270-278
3	Tirucalli	365-375
4	Pteroneuræ	333
5	Diacanthium	
1	Splendentes	290-292
2	Grandifolia	293-296
3	Scolopendrae	299
4	Compressae	300-301
5	Trigonae	302-310
6	Poligonae	312-331
6	Anthacantha	332-341
7	Meleuphorbia	332
8	Dactylanthea	328-330
9	Medusea	322-327
10	Pseudenphorbia	326
11	Pseudomedus	354
12	Treisia	342-351

F. A. PAX  
1858-1942

The writer was Professor Pax's student in 1910-13 and became an Euphorbiacea specialist under his influence, but World War One interrupted his botanical activities until 1960, when he returned to botany in the New York Botanical Garden.

F. A. Pax has described many new Euphorbiae, during 1894-1910, mostly in Engler's Jahrbücher, but also scattered his descriptions in many other places. A short summary of the publication places are as follows:

Engler's Jahrbücher	1894-1910
Engler's Pflansenwelt Ostafrikas	1895
Annals Institut Botany Rome	1895
Bull.Herb.Boissier      Geneva	1898
 Preuss.Acad.Wissensch. Berlin	 1899
Bull.Mus.d'Hist.Naturelle Paris	1902
K.K.Naturh.Hofmus.      Wien	1905
Schles.Ges.Vaterl.Kult.Breslau	1911
Fedde Repert Beihäfte	1910
"      "      "	1922
"      "      "	1923
Blumea	1938

F. A. PAX SYSTEM 1931

1858-1942

Published in 2nd Edition of Die Natürl. Pflanzen Familia  
19c:208, in 9 Sections.

Sect. I	<u>ANISOPHYLLUM</u>	Sect.VII	<u>EUPHORBIUM</u>
	Acutae	1	Arthrothamnus Boiss.
	Elegantes	2	Tirucalli Boiss.
	Hypericifolae	3	Pteroneuvae Berger
	Chamaesyceae	4	Goniostema Baill.
	Pleiadenia	5	Diacanthium Boiss.
	Sclerophylliae	1.	Splendentes Berger
	Gymnadenia	2.	Grandifoliae Berger
	Chelonae	3.	Scolopenitiae Berger
Sect. II	<u>ADENOPETALUM</u>	4.	Compressae Berger
	Zygophyllidium	5.	Trigonae Berger
	Cyttarospermum	6.	Polygonae Berger
	Dichilium	7.	Triacantae Pax
	Alectoroxtonum	8.	Tetracantae Pax
	Petaloma	6	Anthacantae Berger
	Crossadenia	7	Meleophorbiae Berger
	Ephedropeplus	8	Dactylacanthae(Haw.)
	Stachydium		Berger
	Tricherostigma	9	Medusae (Haw.)Berger
	Tithymalopsis	10	Treisia (Haw.)Berger
	Stachydium	11	Pseudomedusae Berger
	Portulacastrum	Sect.VIII	<u>RHIZANTHIUM</u> Boiss.
Sect.III	<u>POINSETTIA</u>	Sect.IX	<u>TITHYMALUS</u>
Sect.IV	<u>EREMOPHYTON</u> Boiss.		Tenellae Pax
	Eueremophyton Pax		Decussatae Boiss.
	Cheirolepidium Boiss.		Oppositifoliae Boiss.
	Holstianae Pax et.K.Hoffm.		Crotonopsidae Boiss.
	Pseudoacalypha Boiss.		Ipecacuanhae Boiss.
Sect.V	<u>LYCIOPSIS</u>		Laurifoliae Boiss.
Sect.VI	<u>PSEUDEUPHORBIUM</u> Pax 1891		Osyridae Boiss.
			Pachycladae Boiss.
			Carunculares Boiss.
			Galarrhaei Boiss.
			Esulae Boiss.
			Myrsinitae Boiss.

Pax did not deviate much from Boissier, but accepted Berger's improvement in regard to the succulents.

N. E. BROWN

Published the most thorough key in existence, not following Boissier's System.

Published in Dyer's Fl. Trop. Afr. (1912) and Fl. Capensis (1916), I tried to show his correlations with Boissier. He is using succulents to a much more important degree than Boissier, and disregards Boissier's nomenclature completely.

In Fl. Trop. Afr. he cuts Euphorbia into two groups.

1. Plants without spine shields ..... 99
2. Succulent plants always armed with prickle. 91

190

In Fl. Capensis he cuts Euphorbia into 4 groups.

- A. Herbaceous, never succulents.....38
- B. Woody shrubs..... 2
- C. Sarublets..... 2
- D. Succulents: These absorb Bossier's -

Euphorbium, Diacanthium, Tirucalli,  
Rhizanthium, Carunculares Eremophytum.... 140  
180

N. E. Brown's succulents comprise Boissier's Sections:

XIX DIACANTHIUM, XX EUPHORBIVM, XVI ARTHROTHAMNUS,  
XVII CAULANTHIUM, and XVIII GONIOSTEMA.

The non succulents are absorbed ANISOPHYLLUM and TITHYMALUS.

N. E. Brown's section is very well thought out. Very practical and useable by beginners. It is very carefully described. However, it is unfortunate that he used six symbols combined with unnumbered, and unsymbolized items, shown only by miniature indentations make a use very cumbersome. I have attempted to apply the well useable plain numbering system.

N. E. BROWN SYSTEM

Fl. Trop. Afr.

1912

1. Plants without spine shields (99).....Boissier nomenclature.
  - 2 Involucres with only 2-3 perfect glands..Chamaesyce.
  - 2 Involucres with 4-5 glands divided...Caruncularis, Euphorbium  
into 3-15 processes.....Lyciopsis, Diacanthium.
  - 2 Involucres with 4-5 glands without  
appendages, pubescent.....Pseudacalypha, Euphorb.
  - 2 Involucres with 4-5(6-8) glands globose, never divided.
  - 3 Herb, branches slender repeatedly forked.....Esula.
  - 3 Herbaceous annuals or perennials, lvs. well developed.
  - 4 Annual decumbent, opposite, white patch..Stachidium.
  - 4 Annual or perennial, lvs. opposite.
    - 5 Glabrous.....Anisophyllum
    - 5 Pubescent on the upper side.....Anisophyllum
    - 5 Pubescent all around.....Anisophyllum
Annual or perennial, lvs. alternate.
  - 6 Involucres solitary.....Eremophyton, Esula,  
Euphorbium, Carunculares
  - 6 Involucres in terminal 3-10  
ragged umbels.....Galarrh., Esula.
  - 7 Glands 2-horned.....Esula.
  - 7 Glands entire.....Galarrh., Eremophyton.
  - 8 Plants 3-9 inches high...Galarrh.
  - 8 Plants 1-5 feet high.....Eremophyton.
  - 8 Shrubs or trees.....Lyciopsis, Pseudacal.,  
Diacanthium,  
Lvs. present.....Tirucalli, Caruncul.,  
Lvs. absent.....Pseudacalypha.
  - 8 Dwarf succulent plant....Euphorbium.
1. Succulent plants always armed with prickles.(91).Diacanthium.  
Involucral glands 4-5 entire and without appendages.

FLORA CAPENSIS  
N. E. BROWN'S KEY.  
1915

1. Herbaceous plants, never succulents nor spiny.
2. Stems evident. Boissier's Nomenclature
3. Lvs with white areas at the base. Sect. VIII Stachidium  
238 E. philloclada
3. None of the leaves w. white areas at the base.
4. Woodstock not tuberous.
5. Opposite.
6. Blade less than 4 times longer than broad.
7. Involucres in cymes. Anisophyllum
8. Glands with petal-like appendages. Eremophyton  
Pseudacalypha
8. Gland without petal-like appendages.
5. Alternate. Galarrhoeus, Eremophyton
9. Lvs. ovate-oblong. Esula
9. Lvs. Linear.
4. Perennial herbs w. tuberous woodstock. Carunculares,  
Eremophyton
2. Stemless herb w. tuberous woodstock. Rhizanthium
1. Woody shrub 5-7 ft. high.
1. Shrublets. Tirucalli
1. Plant distinctly succulents
10. Plants spineless
11. Shrubs bushily branching.
12. Lvs alternate.
13. Distinct tubercules.
13. Without tubercules. Euphorbium
14. Lvs. well developed.
14. Lvs. often absent.
12. Lvs. opposite. Tirucalli  
Tirucalli, Arthrothamnus,  
Diacanthium.
15. Cymes terminal.
15. Cymes racemously branched. Arthrothamnus
11. Stem rootstock very much thicker than branches.
16. Peduncules persisting.
16. Peduncules deciduous.
11. Plants dwarf.
11. Very dwarf.
10. Plants armed with hard sharp spines. Euphorbium
17. Spines not in pairs.
18. Stems tessellately marked.

- |                           |                    |
|---------------------------|--------------------|
| 18. Stems w. 5-20 angles. | <u>Euphorbium</u>  |
| 19. Spines forked.        | (continued)        |
| 19. Spines all entire.    |                    |
| 17. Spines in pairs.      |                    |
| 20. Trees.                |                    |
| 20. Bushes or shrubs.     | <u>Diacanthium</u> |

DEGENER - CROIZAT1936Subsec. 7. Chamaesyce71-169

- 1888 Hillebr. Fl. Haw. 151.  
 1897 Hell. Minn. Bot. Stud.  
 1911 Levl. Fedd. Rep. 10 151.  
 1913 Forbes Occ. Paper Bishop 38.  
 1936 Sherff Bot. Gar. 97:580.  
 1938 Sherff Revision Assn Mo.  
 1939 Sherff Adit. Stu. Field M 17.  
 1949 Sherff Occas. Broh. 20.  
 1936 Degener Chamaesyce (Degener, Otto)  
 1937 Degener-Croizat, Ch-hypericifolia  
 1938 Degener-Croizat Chamaesyce  
 1940 Degener-Croizat Ch. rocki  
 1946 Degener-Croizat Ch. degenerii

DEGENER-CROIZAT With good illustration - strongly supports the importance of the fact that the main stem is abortive above the level of the cotyledons.

The following authors are proponents of segregating Chamaesyce as genus:

Croizat, Dressler, Burch, Hurusawa, Skinner, Millspaugh, Webster.

The difficulty is great to define the genus exactly.

GRADY WEBSTER1962Subsec. 7 Chamaesyce71-169

1962 Journal Arnold Arboretum Vol. 48:422.

WEBSTER retains 3 genera: Euphorbia, Chamaesyce, Pedilanthus

GEN. EUPHORBIA

Subgen. ESULA Pers. (Subsect. THYMALUS Boissier with over 500 sp.)

Sect. Lathyris Gordon (Subs. Epurga Prokh.)

- Sect. Esula Subsect. Esulae Boiss.  
 Subsect. Foveospermae Hurusawa
- Sect. Tithymalus  
 Subsect. Purburatae Prokh.  
 Subsect. Inundatae Webster
- Subgen. AGALOMA (Raf.) Hons (to be drastically recast.)
- Sect. Tithymalopsis  
 Subsect. Corollatae Webster  
 Subsect. Ipecacuanae
- Sect. Zygyphyllidium Boiss.
- Sect. Petaloma Boiss.
- Subgen. POINSETTIA
- Subgen. EUPHORBIA (400 succulent)
- Sect. Euphorbia (Diacanthium Boiss.)  
Sect. Anthacantha (Euphorbium Boiss.)  
Sect. Aphyllis Welt & Berth (Subtr. Tirucalli Boiss.)

GEN. CHAMAESYCEGEN. PEDILANTHUS Poitean.

WEBSTER treats Chamaesyce as an independent genus and specializes in S. E. United States, subdividing the genus into 3 Series.

- Series Peploides Webster 1967 including 12 unlisted sp.  
 " Frostratas Webster 1969 including 50 unnamed sp.  
 " Adenoptera Webster including 7 unnamed sp.  
 " unnamed series including the following 4 limestone endemics:

158-A	<u>E. deltoidea</u>	Engelm. ex Chapm.	Boiss. 72-81
158-B	<u>E. garberi</u>	Engelm. ex Chapm.	Boiss. 114-153
158-E	<u>E. pinetorum</u>	(Small) Jabl.	Boiss. 160-166
20-A	<u>E. porteriana</u>	(Small) Jabl.	

P. G. MEYER

1967

Published in Merxmüller's Prodrömus.

MEYER enumerates his descriptions in alphabetical order. To get his ideas of the system one has to reassemble his order in his key, where he follows more or less N. E. Brown's ideas.

1. Herbs, shrubs without succulent basis.
2. Cymes w. one gland cyatophora Murray
2. Cymes w. 4 glands
  3. Capsule w. fingerform hair glanduligera Pax
  3. Capsule different
    4. Lvs with white basis phylloclada Boiss.
    4. Lvs without white basis

- 5. Lvs. opposite
  - 5. Lvs. alternate
- 1. Not a herb, nor shrub
  - 2. Cactuslike
    - transvaalensis
    - guerichiana
    - currori
    - conspicua
    - subsalsa
    - virosa
    - nemenata
    - avasmontana
    - hottentota
  - 2. Succulent but not cactuslike
    - 3. Lvs opposite
      - verruculosa
      - angrae
      - juttae
      - spartaria
      - cibdela
      - spinea
      - decussata
      - chersina
    - 3. Lvs. alternate
      - 4. Glands without toothlike margin
        - gariepina
        - hamata
        - dregeana
        - mauritanica
        - gummifera
        - gregaria
      - 4. Glands with 2-7 teeth
        - lignosa
        - namaquensis
        - monteiri
        - pseudoduseimata
        - rudis
        - fusca
        - baliola
        - namibensis
        - friderichiae

## PROKHANOV SYSTEM 1949

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## Subgenus PARALIAS (Raf.) Prokh. 1949

Sect. 1 Sclerocyathium Prokh.

1. *E.sclerocyathium* E.Kor.et M.Pop. 1927 376A Caspian.

Sect. 2 Holophyllum Prokh. 1933Ser. Rupestriis Prokh.

2. *serawschanica* Rgl. 1882 446B AsiaCent.  
 3. *monocyathium* Prokh. 1930 446C AsiaCent.  
 4. *rosularis* A.Theod. 1941 446F AsiaCent.  
 5. *tianshanica* Prokh. 1930 446D AsiaCent.  
 6. *prokhanovii* M.Pop. 1938 446E AsiaCent.  
 7. *rupestris* C.A.Mey.ex Ldb. 1830 446 Siberia  
 8. *mongolica* Prokh. 1930 446G Far East  
 9. *pallasii* Turcz. 1852 445 Siberia  
 10. *komaroviana* Prokh. 1949 446A Far East

Ser. Blepharophyllae Prokh.

11. *rapulum* Kar.et Kir. 1842 448 AsiaCent.  
 12. *blepharophylla* C.A.Mey.ex Ldb. 1833 447 AsiaCent.  
 13. *ferganensis* B.Fedtsch. 1916 447A AsiaCent.  
 14. *lipskyi* Prokh. 1933 447B AsiaCent.

Sect. 3 Tulocarpa (Raf. 1833) Prokh. 1949Subsec. 1. Lutescentes Prokh. 1949

15. *scripta* Somm.et Lev. 1892 490A W.Kaukas.  
 16. *squamosa* Willd. 1799 490 Kaukasus  
 17. *macrocarpa* Boiss.et Buhse 1860 491 Kaukasus  
 18. *transoxana* Prokh. 1930 491B TianShan.  
 19. *mucronulata* Prokh. 1930 491 Sir.Dar.  
 20. *kudrjashevii* (Pazij 1848) Prokh. 1949 491C Pam.Al.  
 21. *orientalis* Linn. 1753 478 S.Transk.  
 22. *palustris* Linn. 1753 476 Eur.,Russ.  
 23. *eugeniae* Prokh. 1949 476A W.Transk.  
 24. *carpatica* Woloszszy 1892 456B E.Carpat.  
 25. *tauricola* Prokh. 1949 456C Krym.  
 26. *villosa* W. et Kit. 1802 454A Eur.,Russ.  
 27. *semivillosa* Prokh. 1933 434 Eur.,Russ.  
 28. *aristata* Schmalh. 1892 434A Kaukasus  
 29. *soongarica* Boiss. 1860 477 Transvol.  
 30. *lamprocarpa* Prokh. 1933 477A Pribalk.  
 31. *pilosa* Linn. 1753 454 W.Siberia  
 32. *polychroma* Kern. 1875 494 Cent.Eur.  
 33. *carniolica* Jacq. 1778 507 Cent.Eur.  
 34. *stricta* Linn. Syst. Nat. 1759 526 Europe  
 35. *platyphylla* Linn. 1753 525 S.Russia  
 36. *microsphaera* Boiss. 1846 463 Talysh.  
 37. *coniosperma* Boiss.& Buhse 1860 529 S.Transk.  
 38. *alpina* C.A.Mey. 1830 483 W.Siberia  
 39. *macrorrhiza* C.A.Mey. 1830 487 W.Siberia  
 40. *buchtormensis* C.A.Mey. 1830 484 W.Siberia

Subsec. 2. Purpuratae Prokh. 1949

41. *pubescens* Vahl. 1791 530 Mediter.  
 42. *alata* Boiss. 1860 485 TianShan.  
 43. *lucorum* Rupr.ex Maxim. 1859 473 Far East

- |   |                 |      |      |            |
|---|-----------------|------|------|------------|
| 44. condylocarpa                            | M.B.            | 1808 | 497  | Kaukasus   |
| 45. wittmanni                               | Boiss.          | 1860 | 451  | S.Transk.  |
| 46. pachyrrhiza                             | Kar.& Kir.      | 1841 | 486  | TianShan.  |
| 47. talastavica                             | Prokh.          | 1933 | 486A | TianShan.  |
| 48. dulcis                                  | Linn.           | 1753 | 503  | Europe     |
| 49. angulata                                | Jacq.           | 1788 | 504  | C.Europe   |
| 50. altaica                                 | C.A.Mey.ex Ldb. | 1830 | 506  | W.Siberia  |
| 51. eriophora                               | Boiss.          | 1844 | 460  | S.Transk.  |
| Subsec. 3. <u>Helioscopiae</u>              |                 |      |      |            |
| 52. helioscopia                             | Linn.           | 1753 | 539  | Europe     |
| Sect. 4 <u>Chylogala</u> Prokh.             |                 |      |      |            |
| Subsec. 1. <u>Tibetica</u> Prokh. 1949      |                 |      |      |            |
| 53. tibetica                                | Boiss.          | 1862 | 444  | TianShan.  |
| 54. tranzschetii                            | Prokh.          | 1933 | 444A | TianShan.  |
| 55. bungei                                  | Boiss.          | 1863 | 450  | Iran       |
| 56. schugnanica                             | B.Fedtsch.      | 1916 | 450A | Pam.Al.    |
| 57. turkestanica                            | Rgl.            | 1882 | 450B | Pribalk.   |
| 58. alaica                                  | Prokh.          | 1933 | 450C | Pam.Al.    |
| Subsec. 2. <u>Carunculares</u> Boiss. 1862  |                 |      |      |            |
| 59. ispahanica                              | Boiss.          | 1846 | 434A | Kaukasus   |
| 60. grossheimii                             | Prokh.          | 1930 | 434B | S.Transk.  |
| Sect. 5 <u>Murtekias</u> (Raf.) Prokh. 1949 |                 |      |      |            |
| Subsec. 1. <u>Paralioides</u> Prokh. 1949   |                 |      |      |            |
| 61. paralias                                | Linn.           | 1753 | 660  | Kaukasus   |
| Subsec. 2. <u>Coniocarpae</u>               |                 |      |      |            |
| Ser. <u>Sequierianae</u>                    |                 |      |      |            |
| 62. petrophila                              | C.A.Mey.        | 1850 | 595  | Kaukasus   |
| 63. sequieriana                             | Neck.           | 1770 | 658  | Kaukasus   |
| 64. humilis                                 | C.A.Mey.ex Ldb. | 1830 | 607  | N.Siberia  |
| 65. kopetdaghi                              | Prokh.          | 1933 | 658A | Aralo-Cas. |
| 66. sogdiana                                | M.Pop.          | 1923 | 658B | Pam.Al.    |
| Ser. <u>Nicaeenses</u>                      |                 |      |      |            |
| 67. macroclada                              | Boiss.          | 1840 | 657  | Kaukasus   |
| 68. stepposa                                | Zoz             | 1949 | 656C | Kaukasus   |
| 69. glareosa                                | Pall.           | 1808 | 656  | Krim.      |
| 70. volgensis                               | Krysht.         | 1929 | 656B | Wolgo-Don  |
| 71. goldei                                  | Prokh.          | 1949 | 656A | Krim.      |
| Subsec. 3. <u>Myrsinitae</u> Boiss.         |                 |      |      |            |
| Ser. <u>Biglandulosae</u>                   |                 |      |      |            |
| 72. biglandulosa                            | Desf.           | 1808 | 692  | Krim.      |
| 73. monostyla                               | Prokh.          | 1949 | 691A | Iran,Turk. |
| Ser. <u>Myrsinitae</u>                      |                 |      |      |            |
| 74. spinidens                               | Bornm.ex Prokh. | 1933 | 688A | Pam.Al.    |
| 75. myrsinites                              | Linn.           | 1753 | 686  | Krim.      |
| 76. pontica                                 | Prokh.          | 1949 | 691B | Kaukasus   |
| 77. woronowii                               | Grossh.         | 1916 | 691A | Krim.      |
| 78. marschalliana                           | Boiss.          | 1846 | 691  | Talisch.   |
| 79. armena                                  | Prokh.          | 1949 | 691C | Kaukasus   |
| Ser. <u>Denticulatae</u> Prokh. 1949        |                 |      |      |            |
| 80. denticulata                             | Lam.            | 1786 | 688  | Kaukasus   |

Sect. 6 EsulaeSubsec. 1. Esulae Prokh. 1949Ser. 1. Andrachnoides Prokh. 1949

81. buschiana	Grossh.	1940	614B	Kaukasus
82. undulata	Bieb.	1808	632	Volgo-Don
83. irgisensis	Litw.	1922	639B	Aralo-Cas.
84. andrachnoides	Schrenk.	1844	639A	W.Siberia
85. buhsei	Boiss.	1862	659	Iran

Ser. 2. Esulae

86. esula	Linn.	1753	637	Dnieper.
87. microcarpa	Prokh.	1933	634B	W.Siberia
88. subtilis	Prokh.	1941	634A	Dnieper.
89. gmelini	Steud.	1840	634	Volgo-Don
90. discolor	Ldb.	1849	186	Siberia
91. karoi	Freyn.	1896	186A	E.Siberia
92. borszczowii	Prokh.	1949	186B	Volgo.
93. sareptana	Beck	1858	631	Volgo-Don
94. latifolia	C.A.Mey.	1830	638	W.Siberia
95. borodini	Sambuk	1928	638A	Volgo-Don
96. poecilophylla	Prokh.	1933	642	Pam.Al.

Ser. 3. Lucidae

97. salicifolia	Host.	1797	642	Europe
98. glomerulans	Prokh.	1933	642A	TianShan
99. agraria	M.Bieb.	1808	647	Bessar.
100. severzowii	Herd.	1933	646A	TianShan
101. mandshurica	Maxim.	1884	646B	Manchuria
102. lucida	W.et Kit.	1802	646	Upper Dni.
103. iberica	Boiss.	1860	645	Kaukasus
104. pseudagraria	P.Smirn.	1940	645A	W.Siberia

Ser. 4. Virgatae

105. uralensis	Fisch.	1822	634B	Volgo-Don
106. pamirica	Prokh.	1933	634C	Pam.Al.
107. cyparissias	Linn.	1753	636	Upper Dni.
108. astrachanica	C.A.Mey.ex Claus.	1851	630B	Lower Vol.
109. tshuiensis	(Prokh.)	1880	639A	W.Siberia
110. cyrtophylla	Prokh.	1930	630A	Pam.Al.
111. gurtensis	Prokh.	1933	634D	Pam.Al.
112. leptocaula	Boiss.	1862	630	Russia
113. virgata	W.et Kit.	1805	634	Moravia
114. boissieriana	(Woron.) Prokh.	1931	634G	Kaukasus
115. jaxartica	Prokh.	1933	634H	Cent.Asia
116. zhiguliensis	Prokh.	1941	634J	Volgo-Don.
117. subcordata	C.A.Mey.	1830	639	W.Siberia

Subsec. 2. Sieboldianae

118. sieboldiana	Mork.et Decne	1836	627	Japan
119. savaryi	Kiss.	1921	504A	Far East

Subsec. 3. Patellares

120. amygdaloides	Linn.	1753	673	Upper Dni.
121. glaberrima	C.Koch.	1848	675	Iberia
122. oblongifolia	C.Koch.	1848	673	Kaukasus
123. macroceras	Fisch.,Mey.	1837	676	Iberia

Sect. 7 Herpetorrhiza Prokh. 1933

- |                     |        |      |      |          |
|---------------------|--------|------|------|----------|
| 124. aucheri        | Boiss. | 1846 | 612B | Iran     |
| 125. deltobracteata | Prokh. | 1933 | 612C | Turcmen. |
| 126. polytimetica   | Prokh. | 1933 | 612D | Pam.Al.  |

Sect. 8 Cymatospermum Prokh. 1933Subsec. 1. Oleracea Prokh. 1949

- |                   |                 |      |      |            |
|-------------------|-----------------|------|------|------------|
| 127. aleppica     | Linn.           | 1753 | 547  | Krim.      |
| 128. exigua       | Linn.           | 1753 | 549  | Baltic     |
| 129. graeca       | Boiss.et Sprun. | 1844 | 571  | Krim.      |
| 130. lederbourii  | Boiss.          | 1860 | 561  | Krim.      |
| 131. peplus       | Linn.           | 1753 | 556  | Upper Dni. |
| 132. aulacosperma | Boiss.          | 1853 | 554  | Kaukasus   |
| 133. falcata      | Linn.           | 1753 | 552  | Europe     |
| 134. acuminata    | Lam.            | 1786 | 557  | Kaukasus   |
| 135. normanni     | Schmalh.        | 1892 | 552B | Kaukasus   |
| 136. francheti    | B.Fedtsch.      | 1916 | 552A | TianShan   |

Subsec. 2. Oppositifoliae Boiss. 1862

- |                       |                     |      |      |              |
|-----------------------|---------------------|------|------|--------------|
| 137. inderiensis      | Less.et Kar.et Kir. | 1842 | 385  | Dziung.      |
| 138. triodonta        | Prokh.              | 1930 | 858A | Pam.Al.      |
| 139. sororia          | Schrenk.            | 1845 | 387  | Pribalk.     |
| 140. azerbaijdzhanica | Bordz.              | 1928 | 389A | Kaukasus     |
| 141. consanguinea     | Schrenk.            | 1841 | 389  | Midl.Asia    |
| 142. turczaninowii    | Kar.et Kir.         | 1842 | 388  | E.Kaukas.    |
| 143. arvalis          | Boiss.et Heldr.     | 1853 | 567  | Iran,Asia M. |
| 144. densa            | Schrenk.            | 1845 | 386  | Aralo-Casp.  |
| 145. szovitsii        | Fisch.et Mey.       | 1835 | 566  | Iran         |

Subsec. 3. Densiusculae Prokh. 1949

- |                  |             |      |      |           |
|------------------|-------------|------|------|-----------|
| 146. densiuscula | Pop.et Mey. | 1923 | 566B | Midl.Asia |
|------------------|-------------|------|------|-----------|

Sect. 9 Demetra (Raf. 1840) Prokh.

- |             |        |      |     |        |
|-------------|--------|------|-----|--------|
| 147. lanata | Sieber | 1828 | 309 | Medit. |
|-------------|--------|------|-----|--------|

Sect. 10 Epurga Prokh. 1949

- |               |       |      |     |          |
|---------------|-------|------|-----|----------|
| 148. lathyris | Linn. | 1753 | 384 | Kaukasus |
|---------------|-------|------|-----|----------|

Subgenus CYSTIDOSPERMUM Prokh. 1940

- |                  |               |         |     |             |
|------------------|---------------|---------|-----|-------------|
| 149. cheirolepis | Fisch.et Mey. | 1849-51 | 254 | Aralo-Casp. |
|------------------|---------------|---------|-----|-------------|

Subgenus CHAMAESYCE (Gray) Wheeler

- |                  |         |      |      |             |
|------------------|---------|------|------|-------------|
| 150. nutans      | Lagasca | 1816 | 52   | N.Amer.     |
| 151. indica      | Lam.    | 1786 | 49   | Afr.,Ind.   |
| 152. peplis      | Linn.   | 1753 | 71   | Zakaukas    |
| 153. humifusa    | Willd.  | 1813 | 82   | Asia,W.Sib. |
| 154. chamaesyce  | Linn.   | 1753 | 101  | Asia minor  |
| 155. canescens   | Linn.   | 1753 | 101B | S.Zakau.    |
| 156. turcomanica | Boiss.  | 1760 | 100  | Aralo-Casp. |
| 157. anisopetala | Prokh.  | 1930 | 100A | Asia Cent.  |
| 158. forskalii   | Gay. J. | 1836 | 102  | N.Afr.      |
| 159. maculata    | Linn.   | 1753 | 52   | Atl.Europe  |

FLORA EUROPEA1968System of Smith, A. R. and Tutin, T. E.

Subgen. <u>Chamaesyce</u> Rafin.	1-7
Subgen. <u>Esula</u> Pers.	
Sect. <u>Pachycladae</u> (Boiss.)Tutin	8-9 Insulares
Sect. <u>Carunculares</u> (Boiss.)Tutin	-10
Sect. <u>Helioscopia</u> Dumort.	11-56 Galarrhoes Boiss.
Sect. <u>Myrsinitae</u> (Boiss.)Tutin	57-59
Sect. <u>Lathyris</u> Dumort.	-60 Decussatae
Sect. <u>Cymatospermum</u> (Prokh.)Prokh.	61-69 Seeds ornamented
Sect. <u>Paralias</u> Dumort.	70-94 Lvs palmately veined
Sect. <u>Esula</u> (sensu stricta)	95-105 Lvs pinnately veined

SEE - B. C. J. DUMORTIER, Florula Belgica, Operis majoris  
 Prodromus, Staminacia Tornaci  
 Nerviorum. 1827.

THE NAME FOR THE COMMON BIRD PEPPER

W.G. D'Arcy & W. Hardy Eshbaugh  
Missouri Botanical Garden & Miami University

Capsicum annuum var. aviculare (Dierb.) D'Arcy & Eshbaugh, comb. nov.

Capsicum indicum 5. microcarpon var. aviculare  
Dierb., Handb. Med.-pharm. Bot. 28. 1819. Based  
on C. minimum Mill.

By happy coincidence the lengthy search for the correct name for the common bird pepper turned up the epithet 'aviculare' which is a diminutive form of a Latin word which relates to birds.

An imposing synonymy accompanies this name and much of it will be presented in a future paper. Recently such names as var. minimum (Mill.) Heiser and ssp. baccatum (L.) Terpo have been mistakenly used for this plant.

This variety refers to the widespread and well known American bird pepper which is found as a weed of fence-rows, pastures, cafetales and waste places throughout warm parts of the Western Hemisphere. It is also naturalized in parts of the Old World.

**CATALOGUS  
Euphorbiarum  
1973**

**E. JABLONSKI**

**Vol. I-b**

**SECT. I ANISOPHYLLUM**

**1—176**

I. ANISOPHYLLUM.

Folia omnia opposita, basi obliqua, saepe disticha, raro verticillata. Stipulae lanceolatae vel lineares. Cymae axillares vel terminales, ad involucra solitaria saepe reductae. Glandulae appendiculatae, saepissime quaternae. Semen ecarunculatum. - Herbae vel frutices gerontogei et Americani.

Includes the following 176 species  
grouped into 8 subsections:

- |                            |                                |
|----------------------------|--------------------------------|
| Subsect. 1. Gymnadeniae    | 1-5 (5) Hawaii, Calif.         |
| Subsect. 2. Sclerophyllae  | 6-21 (16) Pacific              |
| Subsect. 3. Cheloneae      | 22-30 (9) Galapagos, Antill.   |
| Subsect. 4. Acutae         | 31-33 (3) Texas, N. Mex.       |
| Subsect. 5. Elegantes      | 34-40 (7) India Or., Australia |
| Subsect. 6. Hypericifoliae | 41-70 (30) Amer., Gerontog.    |
| Subsect. 7. Chamaesyceae   | 71-169 (99) Amer., Gerontog.   |
| Subsect. 8. Pleiadeniae    | 170-176 (7) Brasil, Mexico     |

Definition by Millspaugh -

Chamaesyce S. F. Gray, Nat. Arr. Brit. Pl. 2:260. 1821.

Leaves opposite, inaequilateral; inflorescence solitary or capitulate, axillary and terminal; bracteoles plumose or ciliate; seeds minute, ovoid or elongate-ovoid, more or less quadrangular, the facets smooth or transverse-rugulose.

Type species: *Euphorbia peplis* Linn. Sp. Pl. 652. 1753.

Subsect. I Gymnadeniae 1-5

Ramis articulatis. Folia coriacea majuscula. Glandulae exappendiculatae.

- |                 |               |      |                |
|-----------------|---------------|------|----------------|
| 1. clusiaefolia | Hook. et Arn. | 1832 | Hawaii, Calif. |
| 2. celastroides | Boiss.        | 1862 | Hawaii         |
| 3. multiformis  | Gaudich.      | 1832 | Hawaii         |
| 4. deppeana     | Boiss.        | 1862 | Calif.         |
| 5. hookeri      | Steud.        | 1840 | Hawaii         |

Post Boissier binominals  
Published since 1862.

- |                |               |      |           |                            |
|----------------|---------------|------|-----------|----------------------------|
| 1-A remyi      | A. Gray ex B. | 1866 | Hawaii    | Prodr. 1262                |
| 1-B forbesii   | Sherff        | 1936 | Hawaii    | Bot. Gar. 97               |
| 1-C rockii     | Forbes        | 1909 | Hawaii    | Occ. Pap. Bishop M.        |
| 1-D halemanui  | Sherff        | 1936 | Hawaii    | Bot. Gar.                  |
| 2-A olovaluana | Sherff        | 1939 | Hawaii    | Bot. Gar.                  |
| 2-B atrococca  | Heller        | 1897 | Hawaii in | Minners Bot. Stud. I: 844. |

2-C lorifolia	Hillebrand	1888	Hawaii	Fl.Hawaii Isl.
3-A hillebrandii	Leveillé	1911	Hawaii	in Fedde X:151
3-B sparsiflora	Heller	1897	Hawaii	in Minners Bot.Stud. I:844.
3-C skottsbergii	Sherff	1936	Hawaii	Bot.Gaz.
3-D kuwaleana	Degener & Sh.	1949	Hawaii	
4-A antonyi	Brandeggee	1898	Baja Cal.	Erithea 7:7
4-B clarionensis	Brandeggee	1898	Baja Cal.	Erithea 7:7
4-C incerta	Brandeggee	1891	Baja Cal.	Proc.Cal.Acad.3
4-D longeramosa	Wats.	1890		
5-A festiva	Sherff	1936	Hawaii	(extinct?) Bot.Gaz. =E.deppiana 4.
5-B arnottiana	Endl.	1892	Hawaii	=E.hookeri Steud. 1840.

### Subsect. 2. Sclerophyllae 6-21

Frutices vel suffrutices Pacifici, Antillani vel gerontogei, insulares vel maritimi. Rami articulati. Folia coriacea, saepius majuscula et basi cordata. Glandulae quaternae, appendiculatae. - Transitum ad Gymnadenias praebent species priores.

6. atoto	Forst.	1786	Taiti
7. laevis	Poir.	1812	Timor
8. halophylla	Miquel	1852	Malabar
9. obliqua	F.Bauer	1833	Norfolk
10. cordata	Meyen	1843	Hawaii
11. amplexicaulis	Hook.f.	1846	Galapagos
12. taitensis	Boiss.	1860	Taiti
13. chamissonis	Boiss.	1862	Fidji
14. ramosissima	Hook.& Ar.	1841	India austr.
15. glaucophylla	Poir.	1820	Afr., Senegal
16. livida	E.Mey.	1844	Afr. austr.
17. trinervia	Schum.& Th.		Afr., Guinea
18. organoides	Linn. Am.	1762	Atl:Ascension
19. myrtoides	Boiss.	1862	Australia borealis
20. buxifolia	Lam.	1788	W.I.
21. linearis	Retz.	1783	W.I.

### Post Boissier binominals

9-A aubryana	Baill.	1861-2	N.Caledonia	Adansonia II
10-A degenerii	Sherff.	1836	Hawaii	
20-A porteriana	(Small	1913)	Florida	comb.nov.
20-B cayensis	Millsp.	1904	Bahamas	
20-C bracei	Millsp.	1906	Bahamas	
20-D lecheoides	Millsp.	1906	Bahamas	
20-E exumensis	(Millsp.	1909)	Bahamas	comb.nov.
20-F willsonii	(Millsp.	1909)	Bahamas	comb.nov.

20-G	yayalesia	Urban	1930	Cuba	Fedde
20-H	pinariona	Urban	1930	Cuba	Fedde
20-I	scoparia	(Small	1913)	Flor.Keys	comb.nov.
20-J	keyensis	(Small	1928)	Flor.Keys	comb.nov.81:155.1913
21-A	articulata	Aubl.	1775	Bahamas	

### Subsect. 3. Cheloneae 22-30

Suffrutices, rarius herbae Gallapagenses, unica Antillana, ramosissimae, ramis articulatis tenuibus. Folia carnosula vel coriacea, integra, plerumque minuta. Involucra axillaria et terminalia, solitaria, minuta. Glandulae quaternae, anguste appendiculatae, saepius exappendiculatae.  
- Subsectio potius habitu quam characteribus a praecedenti distincta.

22	vaginulata	Griseb.	1864	Bahamas
23	nummularia	Hook.f.	1846	Galopagos
24	recurva	Hook.f.	1846	Galopagos
25	flabellaris	Anderss.	1854	Galopagos
26	apiculata	Anderss.	1854	Galopagos
27	viminea	Hook.f.	1846	Galopagos
28	articulata	Anderss.	1854	Galopagos
29	diffusa	Hook.f.	1846	Galopagos
30	punctulata	Anderss.	1854	Galopagos

### Post Boissier binominals

25-A	galopageia	Rob.& Gr.	1895	Galopagos
28-A	anderssonii	Millsp.	1900	Galopagos
29-A	bisulcata	Howell	1935	Galopagos
30-A	nesiotica	Rob.& Gr.	1902	Galopagos
30-B	stevensii	Stewart	1911	Galopagos Proc.Cal.Acad.Sc.
30-C	equisetiformis	Stewart	1911	Galopagos Proc.Cal.Acad.Sc.

### Subsect. 4. Acutae 31-33

Herbae perennes, boreali-americanae, rigidae, hirsutae vel strigulosae. Folia apice attenuata, majuscula, integra. Glandulae 4, appendice lobulata instructae.

31	acuta	Engelm.	1859	Texas
32	lata	Engelm.	1859	Texas
33	angusta	Engelm.	1859	Texas

### Post Boissier binominals

31-A	pueblensis	Brandegge	1917	Texas
31-B	xeropoda	Brandegge	1917	Texas
32-A	adicioides	(Small	1903)	Florida comb.nov.
32-B	golondrina	Wheeler	1940	Texas

Subsect. 5. Elegantes 34-40

Herbae annuae Indicae foliis majusculis, floralibus ob internodia brevissima saepissime in strobilos congestis. Involucra in axillis foliorum floralium subsolitaria, breviter pedicellata, eis suboccultata. Glandulae 4, late appendiculatae.

Appendices integrae, sed repandae			
34	pynostegia	Boiss.	1860 India
35	zornioides	Boiss.	1862 India
36	elegans	Spr.	1826 India

Appendices palmati-partitae			
37	fimbriata	Boiss.	1862 India
38	cristata	Roth.	1821 India
39	longistyla	Boiss.	1860 India
40	schizolepis	F.Müll.ex B.	1862 Gulf Carpentaria

Subsect. 6. Hypericifoliae 41-70

Herbae annuae, alatiore, rarius perennes, saepissime erectae. Folia majuscula. Involucra cymosa, rarius solitaria. Glandulae 4, appendiculatae.

1. Leiospermae

41	parvifolia	Linn.	1759 Java
42	reniformis	Blume	1826 Java

Rhytidosperrmae2. Annuae, nunc subperannuales

<u>3. Americanae</u>			
43	pilulifera	Linn.	1753 Florida
44	karwinski	Boiss.	1860 Mexico
45	berteriana	Balb.	W.I. Ex Spreng Syst. III:794.
46	capitellata	Engelm.	1859 Mexico
47	pynarthema	Engelm.	1859 Mexico

<u>3. Old world</u>			
48	bracteolaris	Boiss.	1860 India
49	indica	Lam.	1786 Afr.Trop. Encycl.1786.
50	congenera	Blume	1826 Java

<u>3. Americanae</u>			
51	hypericifolia	Linn.	1753 W.I.
52	pressii	Guss.	1827 Am.bor.
53	lasiocarpa	KL.	1843 Mexico
54	brasiliensis	Lam.	1786 Am.austr.
55	hirtella	Boiss.	1860 Brasilia austr.

56	foliolosa	Boiss.	1862	Brasil.
57	bahiensis	Boiss.	1862	Bahia

3. Old world

58	serrulata	Reinw.		Timor
59	bifida	Hook.f.	1836	China
60	gaudichaudii	Boiss.	1860	Marionn.
61	mitchelliana	Boiss.	1862	Austr.
62	erythroclada	Boiss.	1862	India
63	sumbawensis	Boiss.	1862	Sunda
64	notoptera	Boiss.	1862	India

2. Perennial

65	vestita	Boiss.	1860	Mexico
66	macgillivrayi	Boiss.	1862	Austral.
67	nagleri	Boiss.	1862	Java
68	micredenia	Boiss.	1862	Austral.
69	muelleri	Boiss.	1862	Austral.
70	baueri	Engelm.	1862	Austral.

Post Boissier binominals

43-A	anegadensis	Millsp.	1914	Cuba
43-B	argillosa	Chodat.et H.	1905	Paraguay
43-C	camaguayensis	Millsp.	1914	Cuba
43-D	gemella	Lag.	1817	Nova Hisp.
43-E	glomerifera	Millsp.	1913	Florida comb.nov. Wheeler,Guat.
43-F	hirta	Linn.	1753	Florida
43-G	lansingii	(Millsp.)	1913)	E. U.S. =E.maculata L
43-H	ophthalmica	Pers.	1806	Nova Hisp.
43-I	paludicola	McVaugh	1961	Mexico Nayaril
43-J	paredonensis	Millsp.	1914	Cuba
43-K	trancapatae	Croiz.	1946	Peru
43-L	tomentulosa	Wats.	1887	Mexico
44-A	microcephala	Boiss.	1866	Bolivia
45-A	cozumelensis	Millsp.	1900	Bahamas
45-B	yucatanensis	Millsp.	1916	Yucatan
45-C	oranensis	Croiz.	1943	Argentina
45-D	arequipensis	Croiz.	1945	Peru
45-E	barberiana	Croiz.	1943	Paraguay
45-F	portucabadiana	Croiz.	1943	Paraguay
45-G	rochaensis	Croiz.	1945	Uruguay
46-A	gladiosa	Jones	1929	Sonora
46-B	bicapitata	Brandeggee	1917	Pueblo
46-C	rosei	Millsp.	1916	Mexico
46-D	capitellata	Engelm.	1859	Guayamas
46-E	chamberlini	Johnst.	1924	
49-A	schlecteri	Pax	1901	Columbia Jahrb.28:26
43-M	puberula	Fernald		
43-N	capitata	Lam.	1788	

50-A	duckei	Croiz.	1943	Brazil	
52-A	rafinesquii	Greene.	1897	U.S.	Pittonia
50-B	backeri	Pax & K.H.	1938	Java	
52-B	parciflora	Urban	1919	Haiti	Fedda
52-C	vermiculata	Raf.	1817	E. U.S.	
52-D	rubida	Greenm.	1903	Mexico	
52-E	potosika	Fernald			
53-A	subprostrata	Boiss.	1866	Bolivia	
53-B	moeringioides	Pax	1899	Colombia	Jahrb. 26:507
54-A	apatzingana	McVaugh	1961	Mexico	
54-B	brittonii	Millsp.	1906	Cuba, Bahamas	
54-C	challucophylla	Wheatherby	1919	Jalisco	
54-D	feddeana	McVaugh	1961	Michoa	
54-E	perlignea	McVaugh	1961	Jalisco	
54-F	insulaesalis	Millsp.	1914	Bahamas	
54-G	nirurioides	Millsp.	1914	Jamaica	
54-H	stenomeres	Blake	1922	Guatemala	
54-I	hyssopofolia	Linn.	1753	Fla., Cuba, St. Domingo	
68-A	pancheri	Baillon.	1861	N. Caledonia	

#### Subsect. 7. Chamaesyce 71-169

Herbae vel suffrutices humiliores, saepius prostrati.  
Folia plerumque minuta. Involucra solitaria, rarius  
cymosa. Glandulae 4, saepius appendiculatae. (Conf.  
E. polygonifoliam, ocellatam.)

#### Boissier Subdivision (1)

#### 1. Leiospermae

##### 2. Annuae

71	peplis	Linn.	1753	Mediterr.	
72	polygonifolia	Linn.	1753	Am. bor.	
73	ammanioides	H.B.K.	1817	Amer. centr.	
74	ocellata	Dur. & Hilg.	1854	California	
75	petaloidea	Engelm.	1859	Am. bor.	
76	Geyeri	Engelm.	1845	Illinois	
77	zygophylloides	Boiss.	1860	Texas	
78	polyclada	Boiss.	1860	Texas	
79	ammatotricha	Boiss.	1860	Mexico	
80	serpens	H.B.K.	1817	Amer. bor.	
81	cordifolia	Ell. Sketch	1824	Am. bor.	
82	humifusa	Willd.		Siber. Japan	

##### 2. Perennes

83	albomarginata	Torr. & Gray	1855	Texas, N. Mex.	
84	rotundifolia	Hook. & Arn.	1832	Chili	
85	hartwegiana	Boiss.	1862	Mexico	
86	orbiculata	H.B.K.	1817	Sta Fe	

87	ruiziana	Boiss.	1862	Peru
88	jamesoni	Boiss.	1860	Quito
89	melanadenia	Torr.	1855	California
90	tomentella	Engelm.	1862	Mexico In litt.
91	emarginata	Boiss.	1862	Bras., Merid., Uruguay
92	corrigioloides	Boiss.	1860	India orient.
93	disticha	Engelm.	1862	India orient.
94	linearifolia	Roth.		India orient.

1. Trachispermae

95	trachysperma	Engelm.	1859	Sonora
96	serrula	Engelm.	1859	Texas

Boissier's subdivision (2)

1. Rhytidospermae

(5) Involucri appendices inter se subaequantur

6. Semina transverse rugulis irregularibus vel inter se anastomasantibus vel interruptis vel fractis percursa obliquaudo reticulata scrobiculata.

## 7. Gerontageae

97	arabica	Hochst. & St.	1857	Arabia
98	granulata	Forsk.	1775	Iran, Arabia
99	parvifolia	E. Mey.		Afr. austr.
100	turcomanica	Boiss.	1860	Iran, Transcap.
101	chamaesyce	Linn.	1756	Mediterr.
102	aegyptica	Boiss.	1860	Egypt
103	sanguinea	Hochst. & St.	1857	Arabia, Afr.
104	heyneana	Boiss.	1862	India orient.
105	mosambicensis	Boiss.	1862	Africa
106	oxycoccoides	Boiss.	1860	Madagasc.
107	gallioides	Boiss.	1860	India orient.
108	drummondii	Boiss.	1860	Australia
109	australis	Boiss.	1860	Australia
110	scordifolia	Jacq.		Seneg., Arabia
111	hispida	Boiss.	1860	India orient.
112	coccinea	Roth.		India orient.
113	goliana	Lam.	1786	Borbon

## 7. Americanae

114	magdalenae	Benth.	1844	Calif.
115	fruticulosa	Engelm.	1862	Mexico
116	myrtillofolia	Linn.		W.I. Syst. II. n. 26.
117	balbisii	Boiss.	1860	Bahamas
118	turpini	Boiss.	1862	St. Domingo, Cuba
119	garkeana	Boiss.	1862	St. Domingo
120	fendleri	Torr. & Gray	1855	Texas

121	glaberrima	Kl.		Mexico
122	floribunda	Engelm.	1862	Mexico
123	pilosula	Engelm.	1862	Mexico
124	anychioides	Boiss.	1860	Mexico
125	astyla	Engelm.	1862	Mexico
126	umbellulata	Engelm.	1862	Mexico
127	velligera	Schrauer		Mexico Linn.
128	podadenia	Boiss.	1862	Mexico
129	velleriflora	Boiss.	1862	Mexico
130	grisea	Engelm.	1862	Mexico
131	stictospora	Engelm.	1859	Kansas, Mexico
132	melanocarpa	Boiss.	1862	Ecuador
133	mendezii	Boiss.	1860	Mexico
134	compressa	Boiss.	1862	Venez.
135	leucantha	Boiss.	1862	Mexico
136	meyerriana	Kl.		Bolivia
137	besseri	Boiss.	1862	Chili
138	engelmanni	Boiss.	1860	Chili
139	ovalifolia	Engelm.	1860	Chili
140	quitensis	Boiss.	1862	Quito
141	serpyllifolia	Pers.	1806	Amer. bor.
142	rhytisperma	Engelm.	1862	Chili
143	humistrata	Engelm.	1856	Mississippi
144	setiloba	Engelm.	1857	California
145	micromera	Boiss.	1862	New Mexico
146	polycarpa	Benth.	1844	California
147	villifera	Scheele	1849	Texas, Mexico
148	radioloides	Boiss.	1862	Maine
149	centunculoides	H.B.K.	1817	W.I.
150	sabulicola	Boiss.	1860	Brazil
151	vauthieriana	Boiss.	1860	Brazil
152	revoluta	Engelm.	1859	New Mexico
153	florida	Engelm.	1859	Mexico

6. Semine sulcis transversis inter se parallelis  
 exarata. Species tres priores sulcis basis seminis  
 inter se anasomasantibus irregularibus trans  
 transitum ad precedentes prebent.

154	convolvuloides	Hochst.	1841	Senegambia
155	polycnemoides	Hochst.	1841	Abyssinia
156	maculata	Lynn.	1753	Amer. bor. = E. supina Raf. 1817.
157	thymifolia	Linn.		Tot. Orbis, Fl. Ind. pa.
158	prostrata	Ait.	1789	America Hort. Kew
159	armstrongiana	Boiss.	1862	Australia
160	pediculifera	Engelm.	1859	Mexico
161	glyptosperma	Engelm.	1859	Amer. bor.
162	cumbræ	Boiss.	1830	Mexico
163	arizonica	Engelm.	1859	Mexico
164	leucophylla	Benth.	1844	California

5. Involucris appendices superiores (exteriores) binae obliquae, auriformes duabus inferioribus multo majores.

165	alsinefolia	Boiss.	1860	Bahia, S. Amer.
166	adenoptera	Bertol.		Florida, Texas
167	tettensis	Boiss.	1862	Africa
168	rosea	Retz.	1786	India
169	auricularia	Boiss.	1860	India
165	ss. adenoptera	Bertol		Mt. Hispaniola
	ss. pergamaena	Small		
	ss. gundlachii	Urban		

Post Boissier binominals (1)

71-A	menziensis	Boiss.	1891	Mexico
72-A	platysperma	Engelm.	1880	Calif., S. Ariz. ex Wats
72-B	ingallsii	(Small	1903)	Louisiana comb. nov.
72-C	incerta	Brandege	1891	Baja Cal. Extralimital, Revillagigedo
72-D	eremica	Jepson	1925	Calif., Conchilla Dt.
73-A	rubrosperma	Lotsy	1895	Guatem. Dpl. St. Roso
73-B	nashii	(Small	1903)	Florida Tampa
73-C	chiogenes	(Small	1903)	Fla. Keys
73-D	meridensis	Pittier	1929	Venez.
73-E	guanarensis	Pittier	1929	Venez.
73-F	sanmartensis	Rusby	1920	Colombia
73-G	cumilicola	(Small		Fla. comb. nov.
74-A	gooddingii	Millsp.	1916	Neveda Field: 405
74-B	sulfurea	Millsp.	1916	Calif. Field: 405
74-C	pseudoserpyllifolia	Greene.	1890	Ariz. Pittonia L: 37
75-A	parryi	Engelm.	1875	SW. U. S., Ariz., N. Mex.
77-A	gracillima	Wats.	1886	Ariz.
77-B	missurica	Raf.	1832	Arkansas
77-C	petaloidea	Engelm.	1859	SW. U. S.
77-D	rusbyi	(Croiz.	1938)	Bolivia
80-A	vallis-mortae	(Millsp.	1916)	Calif. Howell 1931
80-B	cinerascens	Engelm.	1859	Mexico, Texas
80-C	serpens	H. B. K.	1817	Argent.
80-D	andromedae	Millsp.	1900	Cuba
80-E	pileoides	Millsp.	1900	Porto Rico
80-F	binamensis	Urban	1930	Cuba (Fedde)
80-G	mangleti	Urban	1930	Cuba (Fedde)
80-H	cowellii	(Millsp.	1916)	Porto Rico comb. nov
80-I	inflexa	Urb. & Ekm.	1929	Haiti
80-J	helwigi	Urb. & Ekm.	1929	Haiti Arkir
80-K	torralbasi	Urban	1899	Cuba (Symb. I: 33)
80-L	blodgettii	Engelm.	1893	Bahamas ex Hitchcock
80-M	apicata	Wheeler	1936	Baja Cal., known only from the type.

80-N	peninsularis	Johnst.	1922	Univ.Cal.Pub.7:440
80-O	eylesii	Rendle		
81-A	brachypoda	(Small	1903)	Fla. comb.nov.
81-B	longeramosa	Wats.	1890	Chichuahua
81-C	intermixta	Wats.	1889	Guayamas
81-E	mosieri	(Small	1932	Fla.
82-A	pseudochamaesyce	Fisch.et.Mey.	1842	

Post Boissier binominals (2)

89-A	vallis matae	Howell	1931	
89-B	cinerarcens	Engelm.	1859	Texas,Mexico
89-C	trichocardia	L.Smith	1936	(Limone Smith)
97-A	arebicoides	N.E.Br.	1913	Angola
97-B	lupatensis	N.E.Br.	1911	Portug.,E.Afr.
97-C	neopolycnemoides	P. & H.	1910	Afr. Austr.
97-D	leshumensis	N.E.Br.	1911	Rhodesia
98-A	angolensis	Pax		Angola
99-A	parrifolia	E.Meyer		

Post Boissier binominals (3)

100-A	emodi	Hook.f.	1890	Afg.,Pakist.,Himal.
100-B	anisopetala	Prokh.	1930	Turkmenia
101-A	laredana	Millsp.		Mediterr.
101-B	canescens	Linn.	1753	Linn.Sp.:653 E.chamaesyce L.var. canescens Boiss.1862.
102-A	forskalii	Gay,Webb,Benth.	1850	Arabia
102-B	aegyptiaca	Boiss.	1860	
102-C	austro-occidentalis	Thell	1916	
103-A	inaequali-latera	Sond.	1850	India,Afg.,Austr.
103-B	glanduligera	Pax	1894	Salem
103-C	pergracilis	P.G.Meyer	1966	G.S.W.Afr.
103-D	nelsii	Pax	1898	Bull.Herb.Boiss.6:737
103-E	pfeillii	Pax	1897	G.S.W.Afr.
103-F	sanguinea v.intermedia	Boiss.	1962	G.S.W.Afr.
103-G	sanguinea v.perensis	N.E.Br.	1915	G.S.W.Afr.
103-H	fischeri	Pax	1894	
103-I	rivae	Pax	1895	
103-J	inaequilatera	Sond.	1850	in Linn.XXIII:105
103-K	parvifolia	E.Mey.	1845	deser.pub.lst by Boiss.
103-L	setigera	E.Mey.	1845	in Driga.2 Pfl.Docum.
103-M	sanquiereae v.setigera,			
	natalensis	Boiss.		
107-A	minutifolia	Boiss.	1866	Australia
109-A	neo-caledonica	Boiss.	1866	N.Caledonia
109-B	tauricola	Prokh.	1949	Crimea
113-A	erythrantha	F.Müll.	1866	Australia ex Boiss.
114-A	espirituensis	Jones	1933	Espir.Sant.Isl.
115-A	tomentulosa	Wats.	1887	Baja Calif.

116-C	hepatica	Urb. & Ekm.	1929	Haiti, Florida
118-A	villosula	Urban.	1899	W.I. Sto Domingo
118-B	niqueroana	Urban.	1930	Cuba
118-C	paucipila	Urban.	1908	Cuba (Symb.v:389
118-D	pinetorum	Small	1903	Florida
120-A	lutulenta	Croiz.	1945	Uruguay
120-B	chaetocalyx	(Boiss.	1862)	Ariz., N.Mex., Texas, Tidestrom 1933.
124-A	linguiformis	McVaugh	1951	Michoacan
124-B	subcoerulea	Rob. & Gr.	1896	Mexico
124-C	tenuissima	Jones	1933	Guadalajara
125-A	hooveri	Wheeler	1940	Calif. (c.valley)
127-A	hirtula	Engelm.	1880	Calif. ex Wats. in Bot. Calif. 2:74
128-A	purisimana	Millsp.	1889	Mex. near podadenia
129-A	tamaulipasana	Millsp.	1916	Mex. comb. nov. near velleriflora
129-B	pantomalaca	Stand. & St.	Guatem.	
131-A	conferta	(Small	1903)	Florida
131-B	interaxillaris	Fernald		
136-A	eichleri	Müll. Arg.	1874	Argentina
139-A	lorentzii	Müll. Arg.	1874	Argentina, Uruguay
141-A	pseudoserpyllifolia	Millsp.	1890	Arizona
141-B	blodgetti	Engelm.	1893	Bahamas ex Hitch.
141-C	minuta	Ph. Cat.	1891	
141-D	albicaulis	Rydb.	1900	Ariz. serpylli- folia Pers.
143-A	multinodis	Urban.	1899	Guadalupe
143-B	gymnadenia	Urban.	1908	Cuba
143-C	leonardi	(Burch)	1966	Haiti comb. nov. Ann. Miss. Bot. Gar. 53:96
144-A	bartolomeni	Greenm.	1889	Baja Calif. (Pittonia)
144-B	versicolor	Greenm.	1881	Ariz., Baja C. (Pitt.)
144-C	laredana	Millsp.	1890	Texas, Laredo Pitt.
144-D	brandegei	Millsp.	1889	S. Pedro, Martin Isl.
144-E	portulana	Wats.	1889	Baja Cal., Isl. in Cayamas harbor.
144-F	floccosiuscula	Jones	1929	Sonora
144-G	patrina	Wats.	1889	Baja Cal., S. Pedro Martin Isl.
144-H	dentosa	Johnston	1922	Baja Cal.
145-A	boserrata	Millsp.	1891	Baja Cal. Contrib. W.B. 15:148.
146-A	crepitata	Wheeler	1939	v. crepuscula
146-B	rattani	Wats.	1885	Calif.
146-C	aureola	(Millsp.)	1916	Calif. comb. nov.
146-D	parishii	Greene.	1886	Calif.
146-E	vallis-mortae	(Millsp.)	1916	Calif. comb. nov. Howell Madrono 1931.

146-F	golondrina	Wheeler	1840	Texas:Brewster Co.
147-A	stanfieldii	(Small)	1903	Cory 1936=villifera Schul.
147-B	senilis	Sta.& Stey.	1944	Guatem.
148-A	linguiformis	McVaugh	1961	Mexico, Michoa.
149-A	crassinodis	Urban.	1899	Cuba
149-B	microclada	Urban.	1924	Cuba
149-C	pachypoda	Urban.	1924	Cuba
149-D	filicaulis	Urban.	1924	Cuba affinis camo-guagensi.
149-E	camaguayensis	(Millsp.)	1924	Cuba Urban.
149-F	minutula	Boiss.	1866	Cuba
149-G	jenningsii	(Millsp.)	1926	Cuba comb.nov.
152-A	grecillima	Wats.	1886	Mex.,Arizona
153-A	jonesii	Millsp.	1890	Mex.,Arizona
154-A	persingii	Pax	1904	Togo Jahrb.33:282
154-B	nelsii	Pax	1898	Afr.
155-A	poggei	Pax	1896	Congo
155-B	leshumensis	N.E.Br.	1911	Mozambique
155-C	villosula	Pax	1894	E. Afr.
155-D	neopolycnemoides	Pax et K.H.		Transvaal.
156-A	albescens	(Urban.)	1899	Porto Rico Millsp. 1916.
156-B	bermudiana	Millsp.	1900	Bermuda
156-C	stipitata	Millsp.	1900	Porto Rico related to maculata fide Millsp.
156-D	batabanensis	Urban.	1908	Cuba
156-E	malaca	(Small)	1903	Louis.,Tex.comb.nov.
156-F	supina	Raf.	1817	E. U.S.
156-G	vermiculata	Raf.	1818	N.W. U.S.,NovaScot.
156-H	glomerifera	(Millsp.1913)	Wheeler 1939	S.Fla.,Tex.
157-A	standleyi	(Millsp.)	1916	Mexico comb.nov. near thymifolia.
157-B	rochaensis	Croiz.	1945	Uruguay
157-C	boliviana	Rusby	1907	Bolivia
158-A	deltoidea	Engelm.exCh.	1897	Florida
158-B	pinetorum	(Small)	1905	Florida Poinsettia
158-C	garberi	Engelm.exCh.	1889	Florida
158-D	tracyi	(Small)	1903	Miss. comb.nov. =supina Raf.1817.
158-E	adhaerens	(Small)	1827	Florida Burch 1956
158-F	tumistyla	(Burch)	1966	Haiti comb.nov.
158-G	chamaecaula	Wheatherby	1919	Jalisco
158-H	dorsiventralis	Urban.	1908	Cuba
158-I	serpyllum	Small	1913	Fla.Keys.
158-J	portoricensis	Urban.	1899	Porto Rico
158-K	ramosa	Seaton	1893	Mexico
158-L	leucansis	Kl.&Gne.		
158-M	var.adherens	(Small)		
160-A	conjuncta	Millsp.	1889	Purisimo
160-B	vermiformis	Jones	1930	Arizona

161-A	greenii	Millsp.	1890	Idaho Pittonia 2:88
161-B	podagrica	Johnston	1912	Nevada
161-C	abramsiana	Wheeler	1934	S. Calif., Arizona
161-D	theriaca	Wheeler	1941	Texas
161-E	pondii	Millsp.	1890	Baja Cal.
163-A	collina	Brandeggee	1911	Calif. Univ. Cal. Pub. 4:184.
163-B	scopulorum	Brandeggee	1911	Calif. U.C. Pub. 4: 184.
164-A	geminicola	Millsp.	1889	Baja Cal.
164-B	involuta	Millsp.	1889	Baja Cal.
164-C	lucismithii	Rob. & Gr.	1896	Guatem. related to leucophylla.
164-D	oaxacana	Rob. & Gr.	1896	Mexico
164-E	peninsularis	Johnston	1922	Baja Cal.
164-F	tremariae	Standl.	1923	
164-G	apicata	Wheeler	1936	
164-H	velutina	Green.	1888	Baja Cal.
164-I	consoquitlae	Brandeggee	1920	Vera Cruz: (?724)
166-A	conferta	Small	1903	Florida
166-B	pergamena	Small	1898	Florida, Cuba, Hosp.
166-C	gundlachi	Urban.	1908	Cuba
166-D	barbicaria	(Millsp.)	1916	Yucatan comb. nov.
166-E	multifoliola	Jones	1933	Guadalajara
166-F	rutilis	(Millsp.)	1916	Guatem.
166-G	monensis	(Millsp.)	1916	Mona Isl. Urban 1929.
166-H	picachensis	(Brandeggee)	1915	Oaxaca Un. Cal. Pub.
166-I	densiflora	Klotzsch	1914	Mexico
166-J	indivisa	Engelm.	1858	New Mex. Tidestr. 1933.
166-K	inaequalis	Klotzsch	1862	Mex. Schiffner 1859.
166-L	dioica	H.B.K.	1817	Br. Guiana
166-M	amoena	Klotzsch	1848	Br. Guiana
166-N	signatepequensis	Standl.	1929	Honduras
166-O	hepatica	Urban. et Ekm.	1929	Isl. Navassa, St. Dom.
166-P	paniciflora	Urban.	1919	Haiti Rep. Sp.: 505
168-A	anisopetala	Prokh.	1930	Turkmenia Bul. J. Bot. U.R. 55.
169-A	carunculata	Waterfall	1948	NW. Oklahoma
169-B	incerta	Brandeggee	1891	Baja Cal.
169-C	seleri	Donn Sm.	1913	Guatem.
169-D	bryophylla	Donn Sm.	1913	Guatem.

L. C. Wheeler 1941

Wheeler's Trinominals.

3. ocellata Durand & Hilgard 1854  
a. var. typica L.C. Wheeler 1936 - Calif.  
b. var. rattani (S. Wats. 1885) L.C. Wheeler 1934-Calif.  
c. var. arenicola (Parish 1899) Jepson 1925 - Calif.
7. missurica Raf. 1832  
a. var. typica L.C. Wheeler 1941 - Arkansas.  
b. var. intermedia (Engelm. 1859) Minnesota, Montana.
16. hirta L 1753  
a. var. typica L.C. Wheeler 1936 - S. Carol., Florida,  
Alabama, Arizona, W.I., Mexico.  
b. var. procumbens N.E.Br. Fk. Trop. Afr. 1911-Florida.
22. pediculifera Engelm. 1859  
a. var. typica L.C. Wheeler 1936 - Arizona  
b. var. linearifolia S. Wats. 1889-Sonora, extralimital.
25. polycarpa Benthham 1844  
a. var. typica L.C. Wheeler 1936-Calif., Nevada,  
L. Calif., Sonora.  
b. var. hirtella Boiss. 1862-Calif., S. Nevada, Baja Cal.  
c. var. simulans L.C. Wheeler - Texas.
32. fendleri Torr. & Gray 1855.  
a. var. typica L.C. Wheeler 1936-Calif., Okla., Sonora.  
b. var. choetocalyx Boiss. 1862-Ariz., N. Mex., W. Texas.  
c. var. triligulata L.C. Wheeler 1936 - Texas.
32. serpyllifolia Pers. 1806  
a. var. genuina Boiss. 1862 - Br. Colum., Alberta, W. Tex.  
b. var. hirtula (Engelm. 1880) L.C. Wheeler 1940-Calif.
41. villifera Scheela 1849  
a. var. typica L.C. Wheeler 1940 - Texas, Mexico.  
b. var. nuda Engelm. ex Boiss. 1862 - Texas.

Subs. 7 Chamaesyceae

71-169

L. C. Wheeler 1941

L. C. Wheeler 1941 has raised this Subs. to the rank of a subgenus in his publication: Following Rafinesq Euphorbia Subgenus Chamaesyce in Canada and United States in Rhodora. A publication of the highest order ever made on this group of 49 species and many trinominals, accompanied with first class illustrations and distribution maps. There exists no such good systematic study of North American Euphorbia, as Wheeler's monograph of the Subgenus Chamaesyce.

But Wheeler doesn't care much about the distinction between Subs. 6 Hypericifoliae and Subs. 7 Chamaesyce and includes Boissier's: acuta (31), angusta (33), lata (32), hirta (43-G), capitellata (46-D) under Chamaesyceae.

Wheeler's Key does not express blood relationships. For this, one has to look for it in his numerical sequence, to see that Boissier's sequence of seed surface is more or less followed, but the Key is not natural.

- 1. Ovary and capsule vestite 160, 146, 74, 80, 89, 89-B, 163, 144, 166-N, 131, 145, 141, 156, 157, 143, 144-C, 101.
- 1. Ovary and capsule glabrous 80, 83, 125, 125-A, 72-A, 152, 152-A, 95, 72, 153.
- 33. exappendiculata 161-B, 74, 145, 146, 146-A.
- 33. with appendages 155, 156-B, 161, 161-A.
- 44. Herbage variously vestite 96, 146, 147, 141, 156-A.
- 44. Herbage glabrous
- 49. Seeds smooth 72-B, 76, 73, 77.
- 49. Seeds wrinkled 147, 81, 120, 146-B, 146, 141.

Derek Burch, Key to the Caribbean members of this section which he raised to the nomenclature status of a genus. South Florida, Bahamas, Antilles.

Following 12 binominals have been reduced to trinominals, following the principle "The weaker the taxon, the longer its name".

- |                      |         |       |                                  |
|----------------------|---------|-------|----------------------------------|
| <u>E. wilsonii</u>   | Millsp. | 20-A  | a variety to <u>lecheoides</u> . |
| <u>E. lecheoides</u> | Millsp. | 20-B  | a remainder.                     |
| <u>E. exumensis</u>  | Millsp. | 20-C  | a variety to <u>lecheoides</u> . |
| <u>E. porteriana</u> | Small   | 20-D  | a remainder                      |
| <u>E. scopania</u>   | Small   | 20-E  | a variety of <u>porteriana</u> . |
| <u>E. deltoidea</u>  | Engelm. | 158-A | a remainder                      |
| <u>E. adenoptera</u> | Bertol  | 166-A | a remainder                      |
| <u>E. pergamaena</u> | Small   | 166-B | a variety of <u>adenoptera</u> . |

<i>E. gundlachii</i>	Urban	166-C	a variety of <i>adenoptera</i> .
<i>E. keyensis</i>	Small	20-G	a variety of <i>porteriana</i> .
<i>E. serpythum</i>	Small	158-E	a ssp. of <i>deltoides</i> .
<i>E. adhaerens</i>	Small	158-F	a variety to <i>delfoidea</i> .

The Key is a good name finding key, not a relationship key.

The Key is a finder of 48 names: 36 bi- and 12 tri-nominals.

#### Subsect. 8. Pleiadeniae 170-176

Perennes, saepius strigulosae, erectae. Folia in nonnullis subverticillata, in aliis basi vix inaequalia. Involucra majuscula, saepe in eadem planta vel tetradenia vel pentadenia aut hexadenia. Semen rugulosum vel scrobiculatum.

170	<i>selloi</i>	Kl.ex.Boiss.	1862	S.Brazil
171	<i>viscoides</i>	Boiss.	1860	Brasilia
172	<i>tamanduana</i>	Boiss.	1860	Bahia
173	<i>caecorum</i>	Mart.	1820	Minas Geraes
174	<i>potentilloides</i>	Boiss.	1860	Goyaz
175	<i>chamaerodos</i>	Boiss.	1860	S.Brazil,Paraguay
176	<i>macropus</i>	Boiss.	1860	Mexico

#### Post Boissier binominals

170-A	<i>setosa</i>	Müll.Arg.	1874	Minas Geraes
170-B	<i>selloi</i>	Boiss.	1862	Argentina
170-C	<i>poliosperma</i>	Urban.	1930	Cuba Fedde 28:235
170-D	<i>hassleriana</i>	Chodat.	1901	Paraguay
173-A	<i>hebegyne</i>	Pax & Hoff.	1937	R.Gr.Sul apud Emerich in Rev.Sudan.Bot.4:83.
173-B	<i>catamarcensis</i> (Croiz.)		1943	Argentina comb.nov.
173-C	<i>caecorum</i>	Mart.	1862	Brazil,Paraguay exBoiss.
176-A	<i>biformis</i>	Wats.	1883	Mexico S.Luis Potosi.
176-B	<i>plummerae</i>	Wats.	1883	S.Arizona
176-C	<i>retroscabra</i>	Wats.	1887	Rio Blanco
176-D	<i>chaculana</i>	Donn.Sm.	1899	Guatemala
176-E	<i>riebeckii</i>	Pax	1901	Arabia
176-F	<i>chamaecula</i>	Wheatherby	1910	

NOTES ON NEW AND NOTEWORTHY PLANTS. LVII

Harold N. Moldenke

*AEGIPHILA MARTINICENSIS* f. *BARBADENSIS* (Moldenke) Moldenke, stat. nov.

*Aegiphila barbadensis* Moldenke in Fedde, Repert. Spec. Nov. 33: 113. 1933.

*CITHAREXYLUM SCHOTTII* var. *PUBESCENS* Moldenke, var. nov.

Haec varietas a forma typica speciei ramulis petiolisque inflorescentisque laminisque foliorum subtus uniforme breviterque pubescentibus recedit.

This variety differs from the typical form of the species in having its branchlets, peduncles, pedicels, flowering calyces, petioles, and the lower leaf-surfaces uniformly short-pubescent.

The type of the variety was collected by Grady L. Webster, W. Preston Adams, Kim Miller, and Lillian Miller (no. 11813) in a disturbed oak-pine forest on limestone about 4 miles west of Antigua, at 5500 feet altitude, Sacatepéquez, Guatemala, on June 27, 1962, and is deposited in the herbarium of the University of Michigan at Ann Arbor, Michigan. The collectors describe the plant as a shrub, 4 meters tall, with white flowers.

*CLERODENDRUM PHILIPPINUM* f. *SUBFERTILE* Moldenke, f. nov.

Haec forma a forma typica speciei floribus omnino vel plerumque fertilibus recedit.

This form differs from the typical form of the species in having many, most, or all of its flowers fertile (even though still "doubled" as in the typical historic nomenclatural form of the species), with the stamens conspicuously long-exserted.

The type of the form was collected by Rahmat Si Boeea (no. 8394) in a marshland and swamp forest at Serbangan (Si Horbangan), northeast corner of topographic sheet 20B, on the east coast of Sumatra, on October 12, 1935, and is deposited in the herbarium of the University of Michigan at Ann Arbor, Michigan. The collector records the vernacular name "boenga sanggoel".

*VERBENA HASSLERANA* var. *GLANDULOSA* Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum perspicue ovatis et pubescentibus ramorum ramulorumque inflorescentiaeque perspicue capitato-glandulosis. This variety differs from the typical form of the species in its leaf-blades being conspicuously ovate and the pubescence on branches, branchlets, peduncles, rachis, bractlets, and calyx being very conspicuously capitate-glanduliferous throughout. The type is Hatschbach 29600 from Rod Br 262, near the Rio Miranda, municipality of Miranda, Mato Grosso, Brazil, on April 17, 1972, deposited in my personal herbarium at Plainfield, N. J. The collector says "Erva flor rosada, pastos secos do pantanal".

**CATALOGUS  
Euphorbiarum**

**1973**

**E. JABLONSKI**

**Vol. II**

**SECT. II-XXV  
177-383**

CATALOGUS  
EUPHORBIARUM II

Sections II - XXV  
incl. 177 -- 383.

In the following pages are treated those sections which form the connecting links between the first and the last two great Sections: ANISOPHYLLUM (I) and TITHYMALUS (XXVI). The individual sections are very unequal and sometimes variable in size. They include all the Succulents (DIACANTHIUM, EUPHORBIVM, and RHIZANTHIUM).

General Breakdown of Boissier's System  
1862

I Appendiculatae Americana

A. Stipulae vel glandulae stipulares

Sect. II	Zygophyllum	177-180	(4)	Herbae	American
Sect. III	Cytospermum		(25)		
1.	Adenopetalum	181-191		Herbae frutices	American
2.	Eumecantus	192-195		Herbae frutices	American
3.	Leptopus	196-205		Herbae frutices	American
Sect. IV	Dichilium	206-209	(4)	Herbae	American
Sect. V	Alectrotonum	210-226	(18)	Frutices	American
Sect. VI	Petaloma	227-229	(3)	Herbae	American
Sect. VII	Crossadenia	230-234	(5)	Herbae vel frutices	Bras.
Sect. VIII	Stachydium	235-238	(4)	Herbae	Brasil

B. Stipulae nullae

Sect. IX	Tithymalopsis	239-246	(8)	Herbae	American
Sect. X	Trichostigma	247-251	(5)	Frutices	American
Sect. XI	Portulacastrum	252-253	(2)	Herbae	Andinae

II Exappendiculatae

A. Stipulae v. aculei stipulares, vel glandulae stipulares

Sect. XII	Cheirolepidium	254	(1)	Herbae	Turcoman.
Sect. XIII	Eremophyton	255-257	(3)	Herbae	Abyssin.
Sect. XIII A	Bongium Boiss.	257-B	(1)		Austral.
Sect. XIV	Nummulariopsis	258	(1)	Herbae	American
Sect. XV	Poinsettia	259-269	(11)	Herbae v. frutices	Amer.
Sect. XVI	Arthrothamnus	270-280	(11)	Frutices articulati	

Capenes et Americani

Sect. XVII	Caulanthium	281	(1)	Herbae	India
Sect. XVIII	Coriostema	282-289	(8)	Frutices	Madag.
Sect. XIX	Diacanthium	290-323	(24)	Frutices carnosos	Abyssin.

B. Stipulae nullae

Sect. XX	Euphorbium	324-357	(34)	Frutices, herbae	Capeland
Sect. XXI	Rhizanthium	358-363	(6)	Herbae acaules	Capeland
Sect. XXII	Tirucalli	364-378	(15)	Frutices subcar.	Gerontog.
Sect. XXIII	Lyciopsis	379	(1)	Frutex spinesc.	Arabia
Sect. XXIV	Pseudocalypha	380-382	(3)	Herbae, suffrut.	Nubia
Sect. XXV	Euphorbiastrum	383	(1)	Frutex	Costarica

Sect. II. ZYGOPHYLLIDIUM

Folia praeter infima rarius basi aequalia. Stipulae glanduliformes. Cymae terminales. Glandulae appendiculatae. Semen tuberculatum. -- Herbae Americanae.

Ecarunculatae

177	hexagona	Nutt	Arkansas
178	bilobata	Engelm. 1859	Ariz., N.Mex.

Carunculatae

179	exstipilata	Engelm. 1859	Texas occ.
180	lacera	Boiss. 1860	Mexico

Post Boissier binominals

177-A	hexagonoides	Wats.	1890	Mexico	Arizona, Chihuahua
177-B	succedanea	Wheeler	1939		
177-C	inocua	Wheeler	1939		
177-D	nephradenia	Barneby	1966	Utah	Leaflet West Bot.
180-A	musciicola	Fernald	1901	Mexico	
180-B	unigladiolosa	Wats.	1887	Mexico	Chihuahua
180-C	sinaloensis	Brandegge	1904	Baja Calif.	

Sect. III. CYTTAROSPERMUM

Folia infima sparsa, caetera opposita. Stipulae glanduliformes. Cymae terminales. Glandulae appendiculatae. Semen favosum. -- Herbae vel frutices. Americani.

1. Appendices glandularum indivisae. Folia floralia concoloria. -- Genus *Adenopetalum* Kl. et Gke loc. cit. p. 47. 181-191
2. Appendices glandularum indivisae. Folia floria petaloidea alba. -- Genus *Eumecanthus* Kl. et Gke loc. cit. p. 42. 192-195
3. Appendices glandularum in lacinias angustas palmatipartitae, rariusdentatae. Glandulae quinae. -- Herbae vel frutices foliis integris ramulis petiolisque tenuibus saepius capillaribus. Genus *Leptopus* Kl. et Gke loc. cit. p. 45. 196-205

Subsect. 1. Adenopetalum.

181 xalapensis	H.B.K.	1817	Mexico
182 spruceana	Boiss.	1862	Peru
183 bifurcata	Engelm.	1959	N.Mex.
184 graminea	Jacq.	1763	Mexico
185 boerhavifolia	Boiss.	1862	Am.Centr.
186 discolor	Boiss.	1862	Am.Centr.
187 acerensis	Boiss.	1862	Bolivia
188 fraseri	Boiss.	1862	Ecuador
189 umbrosa	Bertero		Sto Domingo
190 monantha	Wright		Cuba
191 delicatula	Boiss.	1860	Mexico

Subsect. 2. Eumecanthus.

192 scabrella	Boiss.	1862	Mexico
193 arenaria	H.B.K.	1817	Peru
194 ariensis	H.B.K.	1817	Mexico
195 physalifolia	Boiss.	1860	Mexico

Subsect. 3. Leptopus.

196 poeppigii	Boiss.	1862	Peru
197 adianthoides	Lem.	1788	Peru, Ecuador
198 ocymoidea	Linn.	1788	Mexico
199 sciadophila	Boiss.	1860	Minas
200 astroites	F. et Mey.	1845	Mexico
201 multisetia	Benth.	1844	Mexico
202 francoana	Boiss.	1860	Mexico
203 zieriodes	Boiss.	1862	Mexico
204 segoviensis	Boiss.	1860	Mexico
205 dioscoreoides	Boiss.	1860	Mexico

## Sect. III. CYTAROSPERMUM. - continued

Post Boissier binominals

181-A	enalla	Brandeggee	1914	Mexico
181-B	chiapensis	Brandeggee	1914	Mexico
184-A	dwyeri	Burch	1967	
184-B	galiciana	McVaugh.	1961	Nayarit
184-C	humayensis	Brandeggee	1905	Mexico
184-D	mexicana	Millsp.		
184-E	subsinnuata var. of graminea		1862	Costarica
184-F	pedunculosa	A.Rich.		Cuba
184-G	pubescens	Kl. Gke.		
184-H	graminea v.picta.	Boiss.	1862	Colombia
184-I	graminea v.acutifolia	Boiss.	1862	Costarica
184-J	graminea v.pedunculosa	Boissl	1862	Cuba
184-K	graminea v.subsinuosa	Boissl	1862	Peru,Bolivia
185-A	poepigii v.laxa	Boiss.	1862	Peru,Yurimaguas
186-A	microappendiculata	Lotsy	1895	Guatemala
186-B	violacea	Greenm.	1898	Tehuacan
187-A	chenopodia	Boiss.	1866	Bolivia
187-B	xbacensis	Millsp.	1898	
188-A	popayanensis	Pax	1894	Ecuador,Colombia
191-A	macropodoides	Rob.Gr.	1895	Utah Oaxaca
191-B	humayensis	Brandeggee	1904	Mexico Zoe
191-C	tenera	Wats.	1883	S.Madre
191-D	subcoerulea	Rob.Gr.	1896	Oaxaca
192-A	barnebyi	Millsp.	1913	Mexico Jalisco
192-B	bracteatus	Jacq.	1701	
194-A	biformis	Wats.	1883	Jalisco retroscabra
194-B	villicaulis	Fernald	1901	
198-A	armouri	Millsp.	1895	
200-A	cofradiana	Brandeggee	1904	Sinaloa
200-B	sonorae	Rose	1895	Mexico
202-A	soobyi	McVaugh	1961	Jalisco
203-A	oaxacana	Rob.Gr.	1896	Oaxaca
203-C	chiapensis	Brandeggee	1914	Mexico =zierioides Boiss.
205-A	amouri	Millsp.	1895	Yucatan Field Mus.I=28, Eumecanthus.
205-B	calicicola	Fernald	1901	Mexico Proc.Am.Acad.II:36.
205-C	colimae	Rose	1895	Mexico In Ceiba XI:67.
205-D	culminicola	Molina	1965	Honduras
205-E	drymariaefolia	Schoefn.		Mexico
205-F	pringley	Engelm.	1857	Arizona
205-H	subpeltata	Wats.	1891	Mexico Am.Acad.25:146.
205-J	violacea	Greenm.	1898	Mexico 33:480. Pueblo.
205-K	guadalajarana	Wats.	1887	Mexico Proc.Am.Acad. 22:449,Rio Blan.
205-L	subreniformis	Wats.	1886	Mexico
205-M	digitata	Wats.	1891	S.Luis Potosi.
205-N	biuncialis	McVaugh	1961	Jalisco

Sect. IV. DICHILIIUM.

Folia inferiora sparsa, cetera opposita vel ternata.  
 Stipulae glanduliformes. Cymae terminales. Glandulae  
 bilabiatae, appendiculatae. Semen seriatim tuberculatum.  
 -- Herbae Americanae.

206 anomala	Salzm.	1830	Bahia, Caracas
207 lancifolia	Schlecht.		Mexico
208 towarensis	Boiss.	1860	Venez.
209 oerstediana	Boiss.	1862	Am. Centr.

Post Boissier binominals

206-A	insulana	Croiz.	1943	Cearea
206-B	pilcomayensis	Croiz.	1942	Paraguay E. insulana ssp pilcomayensis.
206-C	tovarensis	Boiss.	1943	Colombia
206-D	surinamensis	Lanj.	1931	Guiana Bat.
208-A	subtrifoliata	Rusby	1920	Colombia
209-A	bevilaniensis	Croiz.	1934	Madagascar
209-B	decarianus	Croiz.	1934	Madagascar
209-C	ridleyi	Croiz.	1937	Straits Setl.

Sect. V. ALECTOROCTONUM.

Folia ternata vel verticillata. Stipulae glanduliformes. Cymae axillares vel terminales. Glandulae appendiculatae. Semen scrobiculatum, ecarunculatum.  
-- Frutices Americani.

Subsect. 1. Glandulae quinae.

210	cotinifolia	Linn.	1756	Trinidad
211	scotana	Boiss.	1862	Mexico
212	petiolaris	Sins		Porto Rico
213	schlechtendalii	Boiss.	1860	Mexico
214	cotinoides	Miq.	1848	Surinam
215	caracasana	Boiss.	1862	Caracas
216	nudiflora	Jacq.		Jamaica
217	apocynoides	Klotzsch		Panama
218	collectiodes	Benth.	1844	Mexico
219	friderichsthalii	Boiss.	1862	Guatemala
220	ligustrina	Boiss.	1860	Mexico
221	peganoides	Boiss.	1860	Mexico
222	xanti	Engelm.	1862	Calif. In litt.

Subsect. 2. Glandulae quaternae, rarissime quinae.Involucra minuta.

223	viridis	(Pavon h.)		Peru
224	saccharata	Boiss.	1860	Mexico
225	haemathanta	Boiss.	1862	Ecuador
226	scandens	H.B.K.	1817	Mexico

Post Boissier binominals

210-A	commonduana	Millsp.	1889	Mexico	May prove a new section, Commonduana
210-B	watsonii	Millsp.	1891	Mexico	in Zoe I:347
210-C	tricolor	Greenm.	1898	Mexico	
210-D	mexiae	Standl.			
210-E	disyeri	Burch	1967	Panama	
210-F	amphimalacca	Standl.	1929		
211-A	scotana var. yavalquahuit	Boiss.	1862	Mexico, Tiosolo	
212-A	nelsonii	Millsp.	1898	Ins. Tres. Madre Baja Calif.	
213-A	padifolia	Brandegee	1914	Oaxaca	near schlechten-dalii Boiss.
213-B	elata	Brandegee	1914		
213-C	mayana	Millsp.	1896	Yucatan	Field Mus. Co. I:304 Aklema Izamal
213-D	verapazensis	Standl. & S.	1944	Guatemala	Alta Verapas
213-E	adinophyta	Donn. Sm.	1909	Centr. Am.	Bot. Gar. 47:261
214-B	var. verrucosa	Boiss.	1862	of cotinoides	Miq. - Brasilia prop. Borba.
216-A	defoliata	Urban.	1912	St. Domingo	just as nudiflora Jacq. 416

(Continued)

Sect. V. ALECTOROCTONUM. (Continued)Post Boissier binominals

218-A	blepharostipula	Millsp.	1890	Baja Cal.	near collec- tioides.
218-B	gaumerii	Millsp.	1898	Yucatan	
218-C	pteroneura	Berger	1907	Riviera	
219-A	leucocephyla	Lotsy	1895	Guatemala	Bot.Gar.Hueh.
219-B	luciismithis	Rob.Gr.	1896	Oaxana	related to E.leucophylla
219-C	ephedromorpha	Bartl.	1898	Guatemala	Am.Acad.43:50
219-D	guatemalensis	Standl.& S.	1944	Guatemala	
222-A	corallifera	Jones	1933	Spain	
222-B	gymnoclada	Engelm.			= xanti
223-A	mandorina	Boiss.	1866	Bolivia	
223-B	longipila	Rusby	1907	Bolivia	
223-C	groenvaldii	Dyer	1938	Transvaal	
223-D	persistens	Dyer	1938	Port.E.Afr.	
226-A	hebegyne	P.& H.	1937	R.Gr.Sul.	Apud Emerich in Rev.Sudam.Bot. N:83.
226-B	plicata	Wats.	1886	Mexico	near xanti Eng.
226-C	tricolor	Rob.Gr.	1898	Tehuacan	

Sect. VI. PETALOMA.

Folia infer. sparsa, caetera opposita. Stipulae lineares. Cymae in umbellam dispositae. Glandulae appendiculatae. Semen tuberculatum, ecarunculatum.  
-- Herbae Americanae.

227	marginata	Pursh.	1814	Am.bor.
228	torrida	DC	1841	Mexico
229	bicolor	Engelm.	1845	Arkansas

Post Boissier binominal

227-A	marginata v.uloleuca	Engelm.et Gr.pl.	Lindt.	53-Ta.
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Sect. VII. CROSSADENIA.

Folia sparsa, floralia opposita. Stipulae glanduliformis. Cymae in umbellam dispositae, rarius ad involucri solitaria reductae. Glandulae appendice palmatipartita. Semen tuberculatum, caruncula crustacea. -- Herbae vel suffrutices Americani.

230	goyazensis	Boiss.	1860	Goyaz.
231	sessilifolia	Klotzsch	1862	Brazil
232	sarcodes	Boiss.	1860	Goyaz.
233	lycioides	Boiss.	1860	
234	gymnoclada	Boiss.	1860	Bahia

Post Boissier binominals

230-A	crossadenia	P.& H.	1923	Brazil
234-A	cymbiformis	Rusby	1895	Bolivia Me.Torr.Bot.Cl.1895.

Sect. VIII. STACHYDIUM.

Folia sparsa, floralia opposita. Stipulae subulatae. Involucri solitaria in axillis inflorescentiae strobiliformis. Glandulae appendiculatae. Semen tuberculatum, carunculatum. -- Herbae Americanae, unica Capensis.

Subsect. 1. Americanae.

235	lupulina	Boiss.	1860	Colombia
236	gollmeriana	Klotzsch	1862	Caracas

Subsect. 2. Capenses.

237	comosa	Vell.		Circa Rio
238	phylloclada	Boiss.	1862	Cape

Post Boissier binominals

236-A	stillingeoides	Rusby	1890	Bolivia	ined
236-B	langunillarum	Croiz.	1967		
236-C	lutzenbergiana	Croiz.	1967		
236-D	invaginata	Croiz.	1943	Paraguay	
236-E	crossadenia	Pax	1923	Bahia	
238-A	hereroensis	Pax	1888		Jahrb.10:35

Sect. IX. TITHYMALOPSIS.

Folia infer. sparsa, superiora opposita vel verticillata. Stipulae nullae. Cymae terminales, interdum in umbellam dispositae. Glandulae appendiculatae. -- Herbae Americanae.

239	corollata	Linn.	1756	Am.bor.
240	curtisii	Engelm.	1860	S.Carolina
241	discoidalis	Chapm.	1860	Florida
242	nudicaulis	Chapm.	1860	Florida
243	pubentissima	Mich.		Carolina
244	mercurialina	Mich.	1803	Tennessee
245	sphaerorrhiza	Benth.		Mexico
246	wrightii	Torr.	1855	Texas

Post Boissier binominals

239-A	apocynifolia	Small	1898	Alabama	Tithymalopsis, Bul.Tor.Bot. Cl. 25:46.
239-B	marilandica	Green	1898		Pittonia III:345
239-C	olivacea	Small	1898	Mississippi	Bul.Tor.Bot. Cl. 25:613.
239-D	arundelana	Bartlett	1921		
240-A	polyphylla	Small	1898	Georgia	Bul.Tor.Bot. Cl. 25:614.
242-B	zinnifolia	Small	1898		
245-A	montereyana	Millsp.	1889	Mexico	Guatemala
245-B	hintonii	Wheeler	1939	Mexico	
245-C	maysillesii	McVaugh	1961	Mexico	Durango related to sphaerorrhiza.

Post Boissier trinominals

239-A	corollata v.grandiflora	Boiss.	1862	Pennsylvania
239-B	corollata v.subpetiolata	Boiss.	1862	Carolina,Alabama
239-C	corollata v.paniculata	Boiss.	1862	Carolina,Georgia
239-D	corollata v.angustifolia	Ell.		Carolina,Alabama
240-A	curtisii v.longipes	Boiss.	1862	Carolina
243-A	pubentissima Mich. v.glabrata	Boiss.	1862	Carolina

Sect. X. TRICHEROSTIGMA.

Folia omnia sparsa. Stipulae nullae. Cymae axillares et terminales. Glandulae 5, appendiculatae, appendicibus integris. -- Frutices Americani.

247	fulgens	Karwinsky		Mexico
248	hindsiana	Benth.	1844	Calif.
249	californica	Benth.	1844	Calif.
250	misera	Benth.	1844	Calif.
251	antisiphilitica	Zuccar.		Mexico

## Post Boissier binominals

247-A	latericolor	Brandegge	1913	Mexico	Univ.Calif.4:377.
250-A	benedicta	Greene			
251-A	ceroderma	Johnst.	1924	Mexico	
251-B	rossiana	Pax	1910	Mexico	Fedde Rep.VIII:162

Sect. XI. PORTULACASTRUM.

Folia omnia sparsa. Stipulae nullae. Cymae ad involucria solitaria axillaria reductae. Glandulae 4, appendiculatae, appendicibus palmatipartitis. -- Herbae Americanae.

252	pentlandi	Boiss.	1862	Bolivia
253	germaini	Philippi	1857	Chili

Sect. XII. CHEIROLEPIDIUM.

Folia infima sparsa, caetera opposita. Stipulae subulatae. Cymae ad involucria solitaria reductae. Glandulae exappendiculatae, palmatifidae. -- Herbae tataricae.

254	cheirolepis	Fisch.& Mey.	1839	Turcomania
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## Post Boissier binominals

254-A	postii	Boiss.	1879	Syria	in Fl.Orient.
254-B	cheirolepioides	Rechinger	1855	Persia	Dansk.Bot.Arkiv.15.
254-C	cheirolepia v.heterophylla	Boiss.	1862	Persia	

Sect. XIII. EREMOPHYTON.

Folia inferiora sparsa, caetera opposita. Stipulae subulatae vel glanduliformes. Cymae ad involucria solitaria reductae. Glandulae exappendiculatae, integrae. -- Herbae gerontogaeae.

255	eremophila	Cunningh.	Australia
256	agowensis	Hochst.	1854 Abyssinia
257	gueinzii	Boiss.	1862 Natal

## Post Boissier binominals

255-A	glaucella	Pax	1898	in Bull.Herb.,Boiss. 6:737.
255-B	kassners	Pax	1904	E.Afr.
255-C	tenella	Pax	1898	Afr.,Austral.
255-D	eremophyla v.latifolia	Boiss.	1862	Austral.
257-A	albovillosa	Pax	1905	Natal

Sect. XIII-A. BONGIUM.

Suffrutices sudanenses. Folia omnia alterna; stipulae glanduliformes. Involucria terminalia, solitaria. Glandulae quinae, stipitatae, patellares. Squamulae inter flores masculos plumosae, numerosae.

257-B	bongensis	Kotschy et Peyr.	Sudan	Pl.Tinn.40.t.19.
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Sect. XIV. NUMMULARIOPSIS.

Folia omnia opposita. Stipulae glanduliformes. Cymae ad involucria solitaria reductae. Glandulae breviter bicornutae. -- Herba Brasilianes.

258	peperomioides	Boiss.	1860	Brasilia
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## Post Boissier binominals

258-A	paranensis	Dusen	1910	Brasil
258-B	yungasensis	Rusby	1883	Bolivia ined.looks like E.paranensis.

Sect. XV. POINSETTIA.

Folia infer. sparsa, superiora opposita vel verticillata. Stipulae glanduliformes. Cymae terminales corymbiformes. Glandulae exappendiculatae, cyathiformes. --  
Herbae vel frutices Americani.

259	pulcherrima	Willd.		Mexico
260	dentata	Mich.	1803	Am.bor.
261	geniculata	Ortega		Mexico, Peru
262	heterophylla	Linn.	1756	Am.bor.
263	cuphosperma	Boiss.	1862	N.Mex.
264	barbellata	Engelm.	1859	Mexico
265	colorata	Engelm.	1859	Mexico
266	eriantha	Benth.	1844	Calif.
267	strigosa	Hook.Arn.	1838	Mexico
268	radians	Benth.	1844	Mexico
269	restiacea	Benth.	1844	Mexico

Post Boissier bi + trinominals

260-A	xylopoda	Green	1898	Oaxaca
260-B	eanophylla	Croiz.	1939	Bolivia
260-C	dentata v.lasiocarpa	Boiss.	1862	Mexico
260-D	dentata v.linearis	Engelm.	1862	St.Louis
260-E	dentata v.rigida	Engelm.	1859	Mexico, Sonora
260-F	dentata v.cuphosperma	Engelm.	1859	N.Mexico
262-A	jaliscensis	Rob.Gr.	1894	Mexico Greenm.
262-B	cyatophora	Murray	1786	G.W.Afr.
262-C	heterophylla v.genuina	Boiss.	1862	Amer.bor.
262-D	heterophylla v.cyathophora	Boiss.	1862	Mexico
262-E	heterophylla v.graminifolia	Engelm.	1859	Amer.bor.
262-F	heterophylla v.minor	Boiss.	1862	Ecuador

Sect. XVI. ARTHROTHAMNUS.

Folia omnia opposita, saepe obsoleta vel squamiformia.  
 Stipulae glanduliformes. Cymae terminales ad involucra  
 solitaria saepe reductae. Glandulae exappendiculatae. --  
 Frutices articulati. Capenses et Americani.

Subsect. 1. Capenses.

270 brachiata	E.Mey.		Cape.
271 decussata	E.Mey.		Cape.
272 burmanni	E.Mey.		Cape.
273 ephedroides	E.Mey.		Cape.
274 racemosa	E.Mey.		Cape.
275 serpiformis	Boiss.	1862	Cape.
276 rhombifolia	Boiss.	1860	Cape.
277 arceuthobioides	Boiss.	1860	Cape.
278 pendula	Boiss.	1862	Cape.

Subsect. 2. Americanae.

279 cassythoides	Boiss.	1860	Cuba
280 alata	Hook.		Jamaica

Post Boissier Binominals

270-A flackii	Pax	1898	Jahrb. 23
271-A chersina	N.E.Br.	1915	G.W.Afr.
271-B lignosa	Marloth	1909	G.S.W.Afr.
271-C engleriana	Dinter	1921	in Fedde 17:263
271-D indecora	N.E.Br.	1915	Cape.
271-E spartaria	N.E.Br.	1911	G.S.W.Afr.
272-A angrae	N.E.Br.	1915	Cape.
272-B ciodela	N.E.Br.	1915	G.W.Afr.
272-C oryctis	Dinter	1930	
272-D pseudobrachiata	Dinter	1923	Fedde Beik.23:68
272-E burmanni v.karroensis	Boiss.	1862	Karroo
273-A corallothamnus	Dinter	1930	
278-A anomala	Pax	1908	G.S.W.Afr.

Sect. XVII. CAULANTHIUM.

Folia omnia sparsa, hysternanthia. Stipulae glanduliformes. Cymae axillares. Glandulae exappendiculatae. -- Herba indica, carnosa.

281 sessiliflora      Roxb.      India or.

Sect. XVIII. GONIOSTEMA.

Folia sparsa, floralia. Stipulae conicae vel cristaeformes. Cymae ex acillis supremis. Glandulae exappendiculatae. -- Frutices madagascarensis, ramis denudatis, apica incrassatis.

Subsect. 1. Stipulae indivisae.

282	pyrifolia	Lam.	1786	Mauritius
283	biovini	Boiss.	1832	Madagascar
284	physoclada	Boiss.	1860	Madagascar
285	thouarsiana	Baill.	1861	Madagascar
286	adenopoda	Baill.	1861	Nossibe

Subsect. 2. Stipulae verticales

287	leuconeura	Boiss.	1862	Madagascar
288	lophogona	Lam.	1786	Madagascar
289	Boissieri	Baill.	1861	Madagascar

Post Boissier binominals

282-A	synadenia	Ridley	1912	Malaya
282-B	ridley	Croiz.	1937	Malaya

Sect. XIX. DIACANTHIUM.

Folia sparsa vel obsoleta, floralia opposita. Aculei stipulares. Cymae axillares vel supra-axillares. Glandulae exappendiculatae. -- Frutices gerontogei, carnosi, pulvinis elevatis tuberculati vel costati.

Tropical and subtropical shrubs distributed between India and the Cape, through Arabia and Abyssinia, with succulent branches and subobsolete leaves. Stipulae spiny double. Very closely related with EUPHORBIUM.

BOISSIER SYSTEM (1862)1. Biaculeatae2) Podaria basi distincta. Rami cylindrici vel obsolete angulati vix sulcati.

290 splendens	Bojer	1829	Madagascar Bot.Mag.2902
291 bojeri	Hook.	1836	Madagascar
292 neriifolia	Linn.	1737	India or. Hort.Cliff.
293 nivulia	Hamilton	1825	India or. Himalaya
294 edulis	Lour.	1790	Cochinchinae
295 obovalifolia	A.Rich.	1851	Abyssinia
296 drupifera	Shum.et Thonn.	1827	Guinea
297 mammillisa	Ch.Lem.	1855	Patria?
298 micracantha	Boiss.	1860	Cape

2. Podaria in costas confluentia. Rami acute angulato-costati.3. Romi compressi.

299 uncinata	DC	Cape
300 stellata	Willd.	1799 Cape
301 squarrosa	Haw.	1827 Cape

3. Rami trigoni vel polygoni.

302 antiquorum	Linn.	1753	India or.
303 lemaireana	Boiss.	1862	Zanzibar
304 tortilis	Rottler	1846	India or.
305 trigona	Haw.	1812	India or.
306 hermentiana	Lem.	1858	Afr.occ.
307 macroglypha	Lem.	1857	Madagascar
308 lactea	Haw.	1825	India or.
309 cactus	Ehrenb.ex B.	1852	Arabia
310 grandidens	Haw.	1825	Cape
311 aculeata	Forsk.	1775	Arabia
312 cattimandoo	Elliott	India or.	
313 Royleana	Boiss.	1862	Himalaya
314 canariensis	Linn.	1753	Canary
315 virosa	Willd.	1799	Cape
316 tetragona	Haw.	1825	Cape
317 polyacantha	Boiss.	1860	Abyssinia
318 abyssinica	Raeuschel	Abyssinia	
319 candelabrum	Tremaux	1857	Nigritica
320 officinarum	Linn.	1753	Aethiopia
321 fruticosa	Forsk.	1775	Arabia

BOISSIER SYSTEM (1862) continued.1. Triaculeatae. Aculeus tertius e pulvino sub binis stipularibus, illis longior.

322 triaculeata	Forsk.	Arabia
323 triacantha	Ehrenb.	Abyssinia

PAX SYSTEM 1905

Pax published a monograph of this section in 1905:  
 Monographische Übersicht über die Afrikanischen Arten aus der  
 Sektion DIACANTHIUM der Gattung Euphorbia in Engler's Botan.  
 Jahrb. 34:pp.61-85. -- Ergänzung pp. 375-376, 1905. -- Mostly  
 based on Berlin material and since better methods of conserva-  
 tion became known.

F. Pax' System 1905.Subsect. 1. Monacanthae Pax

1. monacantha	Pax	1903	290-A	Gallaland	Jahrb.33:285.
2. venenifica	Trem.ex Boiss.	1862	723	Kordofan	manillaris Trem.290-B.

Subsect. 2. Diacanthae (Biaculaetae Boiss.)

3. micracantha	Boiss.	1869	298	Cape.	
mammillosa	Ch.Lem.	1856	297	Patria?	
4.uncinata	DC	1862	299	Cape.	Scolopendria Don Cat.
5.stellata	Wild.	1799	300	Cape.	
6.squarrosa	Haw.	1827	301	Cape.	
7.teka	Schweinf.	1894	296-A	Kordofan.	Niam-niam
8.drupifera	Schum.Thonn.	1827	296	Guinea, Bengalla	
9.renouardi	Pax	1902	296-B	Guinea, Bengalla	
10.obovalifolia	A.Rich.	1851	295	Abyssinia, Eritico	
splendens	Bojer	1829	290	Madagascar	
bojeri	Hook.	1836	291	Madagascar	
macroglypha	Ch.Lem.	1857	307	Madagascar	
neriifolia	Linn.Hort.Cliff.	1737	292	India	Ligularia Roxb.
nivulia	Hamilt.	1825	293	N.W.Himalaya	varians Haw.
edulis	Lour.	1790	294	Cochinchina	
inarticulata	Forsk.	1899	317-D	Arabia	
aculeata	Forsk.	1775	311	Arabia	
parciramulosa	Schweinf.	1899	317-C	Arabia	
lactea	Haw.	1812	317-B	Malaya?	
11.erlougeri	Pax	1903	317-A	Somael.	Jahrb.33.
12.folycantha	Boiss.	1860	317	Abyssinia	
13.resinifera	Berg	1863	316-A	Marocco	
14.tetragona	Haw.	1826	316	Cape.	
15.stuhlmannii	Schweinf.	1899	316-AA	D-Ostafr.	
16.mitis	Pax	1905	316-B	Kilimandschargeb.	
17.quinquecostata	Volkens	1899	315-B	Kilimandschargeb.	
18.virosa	Willd.	1799	315-A	Damaral.	coerulescens Haw. 315.

PAX SYSTEM 1905 - continued

19.echinus	Hook.f.	1874	314-A	Marocco
canariensis	Forsk.	1753	314	Canaren ?-parciramulosa Schweinf.
20.officinatum	Jacks.	1753	320	Marocco
21.beaumiarana	Hook.f.	1874	320-A	Marocco
fruticosa	Forsk.	1775	321	Arabia
septemsulcala	Viekappri		321-A	Socotra
22.robecchii	Pax	1896	304-A	Somalil.
tortilis	Rottler	1841	304	India, Ceylon
23.hermentiana	Ch.Lem.	1858	306	Gabun.
24.amplophylla	Pax	1896	306-A	Somalil.
antiquorum	Linn.	1737	302	India, Ceylon
trigona	Haw.	1812	305	India
25.winkleri	Pax	1901	318-C	Ussangu.
26.nyikae	Pax	1895	318-A	Nyika steppe
27.lemaireana	Boiss.	1862	303	Sansibar
28.dekindtii	Pax	1905	318-CC	Benguelo.
29.bussei	Pax	1903	318-B	D-Ostafr.
grandicornis	Göbel	1889	318-C	Vaterl. unbekannt.
30.grandidens	Haw.	1825	310-A	Cape. arborescens Hort., magnidens Hort.
31.quadrialata	Pax	1903	318-D	Sansibar
32.confertiflora	Volkens	1899	318-E	Usambara
ammak	Schweinf.	1899	318-F	Yemen
33.neovolkensis	Pax	1901	318-BB	Usambara
34.reinhardtii	Volkens	1899	318-G	D-Ostafr.
35.kamerunica	Pax	1905	318-H	Kamerun
36.intercedens	Pax	1905	318-I	D-Ostafr. confertifl. Rein.
37.angularis	Klotzsch.	1862	318-K	D-Ostafr.
38.candelabrum	Klotzsch.	1857	319	Kordofan.
39.cactus	Ehrenb.	1862	309-A	Erithrea
40.abysinnica	Raeusch.	1862	318	Abyssinia
royleana	Boiss.	1862	317-B	India
41.thi	Schweinf.	1868	317-A	Erithrea

Subsect. 3. Triacantae (Subsect. Triaculeatae Boiss. 1862)

42.triaculeata	Forsk.	1775	322	Erithrea
43.graciliramea	Pax	1905	322-A	G. East Afr.
44.triacantha	Ehrenb. ex B.	1862	323	Erithrea
45.fauroti	Franch.	1887	323.1	Somalil.
46.xylacantha	Pax	1905	323.2	Somalil.
47.antunesii	Pax	1905	323.3	Benguelo.
48.glochidiata	Pax	1896	323.4	Somalil. Habitus der splendens.
49.schizacantha	Pax	1896	323.5	Somalil.
50.infesta	Pax	1905	323.6	Erithrea

PAX SYSTEM 1905 - continuedSubsect. 4. Tetracanthae Pax 1901.

51.etracantha	Pax	1901	323.7	Nyassal Jahrb.30:341
52.coerulans	Pax	1898	323.8	Benguelo.
53.ellenbeckii	Pax	1903	323.9	Somalil. Jahrb.33:285
54.tetracanthoides	Pax	1901	323.10	Ussangu
55.isacantha	Pax	1905	323.11	D-Ostafr.
56.schinzii	Pax	1898	323.12	Transvall.Pretoria Herb. Boiss.VI.
57.angustiflora	Pax	1905	323.13	Nyassal Jahrb.30:341.
58.kunthii	Pax	1905	323.14	S.Ostafr.
59.heteracantha	Pax	1903	323.15	Benguelo.
60.taitensis	Pax	1905	323.16	Kilimandscharogel.,Taita
61.heterichroma	Pax	1895	323.17	D-Ostafr.
62.quadrangulari	Pax	1894	323.18	O.Afr. Jahrb.XIX
63.platyacantha	Pax		323.19	Nyassal.

Subsect. 5. Intermedae

64.breviarticulata	Pax		323.20	W.Usambara
65.mbaluensis	Pax		323.21	W.Usambara
66.buruana	Pax	1930	323.22	Kilimandscharogel.

Species ignotae fortana ad Sect. DIACANTHIUM pertinentes

subapoda	Baill.	1887	Madagascar	Baill. in Bull.Soc. Lona Paris 1:671.
stenoclada	Baill.	1887	Madagascar	Baill. in Bull.Soc. Lona Paris 1:673.

Post Boissier binominals

290-A	mellii	Ch.Mont.	1940	Madagascar
290-B	monacantha	Pax	1904	Jahrb.XXXIII:285
290-C	venenifica	Trem.		
293-A	caducifolia	Haines	1914	India,Pakistan
295-A	amplophylla	Pax	1896	Somalil. 306-A
295-B	vobechii	Pax	1895	Somalil.
296-A	teka	Schweinf.ex Pax	1896	Niam-niam
296-B	renouardi	Pax	1902	Dahomy
296-C	juvoclanti	Pax	1909	
297-A	aspericaulia	Pax	1901	
297-B	caterviflora	N.E.Br.	1915	Karoo,Pretoria
297-C	manillosa	Ch.Lem.	1855	Patria?
299-A	gilberti	Berger	1907	S.Afr.
300-A	aleicornis	Bak.	1887	Madag.=ramiprens Croiz.1934
301-Y	micrantha	Boiss.		
302-A	inarticulata	Schweinf.	1888	Arabia
302-B	mayuranthanii	Croiz.	1940	Madagascar
303-A	crispata	Lem.	1857	Zansibar
310-A	evansii	Pax	1909	Transvaal 323.15
310-B	ramipressa	Croiz.	1934	Madagascar (alcicornis)
310-C	sekukuniensis	Dyer	1940	Transvaal.
311-A	tenuirana	Schweinf.	1907	=aculeata Forsk.
314-A	parciramulosa	Schweinf.	1899	Yemen

## Sect. XIX. DIACANTHIUM.

Post Boissier binominals - continued

315-A	coerulescens	Haw.	1826	East Cape, Damaraland
315-B	perangusta	N.E.Br.	1938	
315-C	virosa	Wills.	1799	Cape
315-D	knobellii	Letty	1934	Transvaal
315-E	quinquecostata	Volkens	1899	Kilimandscharo.
315-F	echirus	Hook.f.et Coss	1874	Marocco
316-A	excelsa	W.D.S.	1941	Transvaal
316-B	mitis	Pax	1905	Kilimandscharo. stuhlmanni Schw.
316-C	lyndenburgensis	Schweinf.		
316-D	bothae	Lotsy-Goddy		
316-E	tetragona	Haw.		
316-F	hanarensis	Pax	1907	Abyssinia
316-G	stuhlmannii	Schweinf.ex Volkens	1899	G.E.Afr.
316-H	pseudocactus	Berger	1907	Patria?
316-I	longecomula	Pax	1892	
316-J	triangularis	Def.		Cape
316-K	franckiana	Berger	1907	Patria?
317-A	erlangeri	Pax	1903	Gallahashl., Somalil.
317-B	quadrangularis	Pax	1894	
317-C	thi	Schweinf.	1868	Nubia
318-A	sancta	Pax	1907	Abyssinia
318-B	reinhardtii	Volkens	1899	G.E.Afr.
318-C	similis	Berger	1907	Natal
318-D	neutra	Berger	1907	Patria?
318-E	menelikii	Pax	1907	Abyssinia
318-F	togoensis	Pax	1909	
318-G	winkleri	Pax	1901	
318-H	diviteri	Berger	1906	G.S.W.Afr.
318-I	avasmontana	Dinter	1928	S.W.Afr.
318-J	fasciculata	Thumb.		
318-K	quadrialata	Pax	1904	G.E.Afr., Sansibar
318-L	huberti	Pax	1911	Brit.E.Afr.
318-M	multiradiata	Pax et K.	1910	
318-N	winkleri	Pax	1901	Ussangu
318-O	nyikae	Pax	1895	Nyikasteppe
318-P	dekindlii	Pax	1905	Benguela
318-Q	bussei	Pax	1903	G.E.Afr.
318-R	neovolkensis	Pax	1905	E.Afr., Usambara
318-S	intercedens	Pax	1905	G.E.Afr.
318-T	angularis	Klotzsch	1862	
318-U	confertiflora	Volkens	1899	Usambara
318-V	ammak	Schweinf.	1899	
318-W	reinhardtii	Volkens	1899	
318-X	kamerunica	Pax	1905	
318-Y	ricgardiana	Baill.		Abyssinia
318-Z	vockmannas	Dinter	1923	G.S.E.Afr.

## Post Boissier binominals - continued

318-AA	deightonii	Croiz.	1938	Sierra Lea
318-BB	schoenlandii	Pax	1904	
318-CC	conspiaca	N.E.Br.	1912	Angola
318-DD	hottentotta	Marloth	1930	Namaqualand
318-EE	abyssinica	Rich.		
318-FF	abyssinica	Berger		
318-GG	abyssinica	Lem.		
318-HH	abyssinica	Schwienf.		
318-II	bellica	Hiern.	1900	dekindlii Pax may be superflora
318-JJ	leterochroma	Pax	1895	G.E.Afr.
319-A	candelabrum	Tremaux	1857	v.erythraea Berger 1907
319-B	ammak	Schwft.	1899	Yemen
319-C	parciramulosa	Schwft.	1899	Yemen
319-D	candelabrum	Kotschy	1857	Kordofan=hermentiana
319-E	thi	Schweinf.	1868	Nubia
319-F	aethispum	Croiz.	1941	Abyssinia
320-A	beaumieriana	Hook.f.et	Coss. 1874	Marocco
320-B	echinus	Hook.f.et	Coss. 1874	Marocco
320-C	resinifera	Berger	1863	Marocco
320-D	stapfii		1907	Uganda
321-A	septemsulcata	Vichopper	1904	Sokotra
322-A	graciliramea	Pax	1905	G.E.Afr.

Subsect. Triaculeatas

323.1	fauroti	Franch	1887	Somalil.
323.2	xylacantha	Pax	1905	Somalil.,Harror
323.3	antunesii	Pax	1905	Benguela
323.4	glochidiata	Pax	1896	Somalil
323.5	schizacantha	Pax	1896	Somalil.
323.6	infeata	Pax	1905	Eritirea
323.7	tetracantha	Pax	1901	Nyassaland =nyassai (non Rende)
323.8	coerulans	Pax	1898	Benguela
323.9	ellenbeckii	Pax	1903	Somalil.
323.10	tetracanthoides	Pax	1901	Ussangu
323.11	isacantha	Pax	1905	G.E.Afr.,Ungori
323.12	schinzii	Pax	1898	Transvaal,Pretoria
323.13	angustiflora	Pax	1905	Nyassaland
323.14	kunthii	Pax	1905	S.E.Afr.
323.15	heteracantha	Pax	1905	Benguelo
323.16	taitensis	Pax	1905	Kilimandscharo.
323.17	heterochroma	Pax	1895	G.E.Afr.,Kilimandscharo.
323.18	quadrangularis	Pax	1894	E.Afr.
323.19	platyacantha	Pax	1904	Nyassaland
323.20	breviarticulata	Pax	1905	W.Usambaro
323.21	mbaluensis	Pax	1905	W.Usambaro
323.22	baruana	Pax	1930	Kilimandscharo
323.23	griseala	Pax	1905	Betschutenaland

## Post Boissier binominals

Subject. Triaculeatas - continued

323.24	opuntioides	Welw.ex Hiern.1900	Pungo-Andongo
323.25	graeiliramea	Pax 1905	
323.26	philipsiae	N.E.Br. 1903	Somalil.
323.27	subsalea	Hiern 1900	G.S.W.Afr.
323.28	venesata	Marloth 1930	G.S.W.Afr.
323.29	subsalea v.kacksensis	W.D.S.1941	G.S.W.Afr.
323.30	kamerunica	Pax 1903	Kamerun
323.31	subapoda	Baill. 1887	Madagascar
323.32	stenoclads	Boiss. 1887	Madagascar
323.33	polyacantha	Hiern 1900	
323.34	glanigera	N.E.Br.	
323.35	enormis	N.E.Br.	
323.36	gloisiana	N.E.Br.	
323.37	insulae-europas	Pax 1909	
323.38	complexa	Dyer 1937	Transvaal
323.39	tortirana	Dyer 1937	Transvaal
323.40	tubiglans	Marloth 1934	ex Dyer
323.41	susannae	Marloth	
323.42	vandermerwai	Dyer 1937	Transvaal
323.43	corriculata	Dyer 1949	Portug.,E.Afr.
323.44	insagualis	N.E.Br.	E.Cape.
323.45	nemoralis	Dyer 1952	S.Rhodesia
323.46	brevilata	Baill. 1959	Kenya
323.47	leucochlarrigo	Chiov. 1929	Somalil.
323.48	nigrispina	N.E.Br. 1913	Somalil.
323.49	kelleri	Pax 1898	Somalil.
323.50	platycantha	Pax 1904	Trop.Afr.
323.51	schiracantha	Pax 1897	
323.52	somalensis	Pax 1931	Somalil.
323.53	uhligiana	Pax 1909	

## Post Boissier trinominals

293-A	nivulia v.helicothele	Boiss. 1862	Madagascar
302-A	antiquarum v.polygona	Boiss. 1862	India
314-A	canarensis v.spiralis	C.Bolle 1862	Insul.Canar.
318-A	abyssinica v.mosambicensis	Boiss. 1862	Mozambique

Sect. XX. EUPHORBIUM.

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Boissier subdivides his Section the following way:

XX.Euphorbium. -- Folia sparsa vel obsoleta, floralia opposita vel ternata. Stipulae nullae. Cymae axillares vel supre-axillares, interdum terminales. Glandulae exappendiculatae. -- Frutices, raries herbae, gerontologiei, carnosi, tuberculati vel costati, pedunculis interdum spinescentibus.

## 1. Glands funnel like.

324	longetuberculosa	Hochst.	Abyssinia
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## 1. Glands bilabiate

325	tuberculata	Jacq.	Cape
326	caput-medusae	Linn.	Cape
327	parvimamma	Boiss.	1862 Cape
328	anacantha	Ait.	Cape
329	ornithopus	Jacq.	Cape
330	globosa	Sims	Cape

## 1. Glands flat, entire.

## 2. Stems and branches angled.

## 3. Pedunculs deciduous.

331	ingens	E.Mey.	Port Natal.
332	meloformis	Ait.	Cape
333	scopoliana	Steud.	Patria?

## 3. Pedunculs persistent.

334	mammillaris	Linn.	1753 Cape
335	cereiformis	Linn.	1753 Cape
336	polygona	Haw.	1806 Cape
337	heptagona	Linn.	Cape
338	enopla	Boiss.	1860 Cape
339	pentagona	Haw.	1827 Cape
340	horrida	Boiss.	1860 Cape
341	stellaeaspina	Haw.	1826 Cape

## 2. Stems and branches not angled.

## 4. Peduncules persistent.

342	clava	Jacq.	Cape
343	coronata	Thunb.	Cape
344	dubalina	Boiss.	1860 Cape
345	oxystegia	Boiss.	1860 Cape
346	radiata	E.Mey.	Cape
347	hystrix	Jacq.	Cape

Sect. XX. EUPHORBIUM - continued

## 4. Pedunculs deciduous.

348	cervicornis	Boiss.	1860	Cape
349	gariepina	Boiss.	1860	Cape
350	peltigera	E.Mey.		Cape
351	hamata	Sweet		Cape
352	stapelioides	Boiss.	1860	Cape
353	clavarioides	Boiss.	1862	Cape
354	pugniformis	Boiss.	1862	Cape
355	cladestina	Jacq.		Cape
356	proteifolia	Boiss.	1862	Cape
357	bupleurifolia	Jacq.		Cape

Post Boissier binominals (1)

324-A	ladremautica	Bak.	1934	
324-B	napoides	Pax	1897	
324-C	oblongicaulis	Bak.		
324-D	oblongifolis			
324-E	phosphorea	Marloth	1820	Bahia
324-F	rubella	Pax	1904	
324-G	poissorii	Pax	1902	
325-A	schubei	Pax	1905	Nyassal.
325-B	melonshydrala	Nel.	1935	Little Namapal (Jahrb.D.Kokl.Geb. I:31)
325-C	marenskiana	Dinter	1938	not in Kew Index - in Fedda 48:263.
325-D	namaquensis	N.E.Br.	1915	Cape
325-E	monteiri	Hook.f.	1926	Afr. austro-occ.
325-F	heteropoda	Pax	1905	Kilimandscharo. - tuberculata Jacq.
325-G	shubei	Pax	1905	Nyassal.
325-H	multiceps	Berger	1905	Cape
326-A	baliola	N.E.Br.	1915	Namaquol.
326-B	friedrichiae	Dinter	1914	G.W.Afr. or 325
326-C	merenskiana	Dinter	1938	G.W.Afr.
326-D	fusca	Marloth	1912	
326-E	monteiroi	Hook.f.	1865	=marlothi Pax 1888.
326-F	namibensis	Marloth	1909	=argillicola Dinter.
326-G	dubeimata	Dyer		
326-H	pseudoduseimata	W.D.S.	1941	
326-I	rudis	N.E.Br.	1915	Cape
326-J	marieutalii	Dinter	1921	G.S.W.Afr.
326-K	rangeana	Dinter	1923	G.S.W.Afr.
326-L	filiflora	Marloth	1921	Fedde 17:265
326-M	simplex	Dinter	1931	nomen Fedde 29:164.
326-N	argillicola	Dinter	1914	G.S.W.Afr.
326-O	duseimata	Dyer	1934	Betchnausland

## (2) - Post Boissier binominals - continued

326-P	cendornensis	Dinter	1932	Fedde 30:196
326-Q	marienthai	Dinter	1921	Fedde 17:504
326-R	marlothii	Pax	1888	Jahb. 10:36
326-S	arida	N.E.Br.		Simita =duseimata Dyer.
326-T	orabensis	Dinter	1914	G.S.W.Afr.
326-U	maleolens	Phil.	1932	
326-V	muirii	N.E.Br.	1915	
326-W	hereroensis	Pax	1889	Afr.austro.occ.
326-X	claytonioides	Pax	1897	Angola
327-A	viperina	Berger	1902	Cape
328-A	globosa	Sims	1826	
328-B	tridentata	Lam.	1786	
331-A	grandialata	Dyer	1937	
331-B	grausicornis	Goebel	1889	
331-C	zoutpansbergensis	Dyer	1938	
331-D	barnardii	Dyer & Sloan	1941	
331-E	ballyi	S.Carter	1963	
331-F	cooperi	N.E.Br.	1924	Natal.
331-G	ingens	E.Mey.	1835	
331-I	grandicornis	Goebel	1889	Patria?
333-A	sipolisii	N.E.Br.	1893	Brazil?
333-B	pteroneura	Berger	1907	Mexico?
334-A	erosa	Willd.	1809	Cape
334-B	submamillaris	Berger	1902	Cape
334-C	mamillaris	Linn.	1756	v.spinosior Berger
334-D	latimamillaris	Croiz.	1932	Cape Cod
334-E	platimamillaris	Croiz.	1932	Cape Cod
336-A	homida			
336-B	morinii	Berger	1907	Cape
339-A	ledienii	Berger	1907	S.Afr.
339-B	aggregata	Berger	1907	Cape
339-C	mamillaris	Linn.		
341-A	astrispina	N.E.Br.	1915	
341-B	stellaespona	Haw.	1826	Cape
341-C	pillansii	N.E.Br.		Cape
341-D	valida	N.E.Br.	1915	
342-A	pseudohypogea	Dinter	1921	Fedde 17:263
342-B	pseudodiseimala	W.D.S.	1941	G.S.W.Afr.
342-C	pseudohypogoea	Dinter	1921	Tas Gobabis
344-A	tugelensis			
348-A	fasciculata	Thunb.		Pr.B.Sp.
349-A	schäferi	Dinter	1921	G.S.W.Afr.
352-A	jullae	Dinter	1914	=silicicola
352-B	spartaria	N.E.Br.	1911	
352-C	vemiculosa	N.E.Br.	1925	Cape

Post Boissier binominals (2) - continued

352-D	silicicola	Dinter	1914
353-A	escubenta	Marloth	1926
354-A	gatbergensis	N.E.Br.	1915
354-B	franksiae	N.E.Br.	1915
354-C	woodii	N.E.Br.	1915
354-D	gorgonis		
354-E	passa	N.E.Br.	

Post Boissier trinominals

326-A	caput-medusae v. major	Act.Hort.Kew :138	Roma hortensis
335-A	cereiformis v.echinata	ill. Pr.asalm Dyck in litt:343	Cape

Sect. XXI. RHIZANTHIUM.

Folia sparsa, floralia. Cymae terminales saepe umbelliformes. Stipulae nullae. Glandulae exappendiculatae.  
 -- Herbae gerontogaeae, acuales, ad apicem rhizomatis carnosifoliosae.

358	tuberosa	Linn.	1756	Cape
359	pistiaefolia	Boiss.	1862	Cape
360	elliptica	Thunb.		Cape
361	acaulis	Roxb.		Bengalia
362	fusiformis	Ham.		Himalaya
363	nana	Royle		Himalaya

Post Boissier binominals

358-A	guachanca	Azara	1809	Peru	nomine tantum nota.
360-A	crispa	Sweet			
360-B	undulata.	Boiss.	1862	Cape	

Sect. XXII. TIRUCALLI.

Folia sparsa, saepe obsoleta vel squamiformia, floralia opposita vel ternata. Stipulae nullae. Cymae terminales, saepe monocephalae et in umbellam dispositae. Glandulae exappendiculatae, planae. -- Frutices subcarnosi, gerontogei, unicus Chilenses.

364	lactiflua	Philippi		Chili
365	obtusifolia	Poir.		Teneriffa
366	mauritanica	Linn.		Cape.
367	bottae	Boiss.	1862	Arabia
368	melanosticta	E.Mey.		Cape.
369	hydnoxae	E.Mey.		Cape.
370	phymatoclada	Boiss.	1860	Cape.
371	dregeana	E.Mey.		Cape.
372	lateriflora	Shum.et Thonn.		Guinea
373	tirucalli	Linn.		Afr.or.
374	aphylla	Brouss.		Teneriffa
375	schimperi	Presl.		Arabia
376	larica	Boiss.	1860	Persia
377	spicata	E.Mey.		Cape.
378	gummifera	Boiss.	1860	Cape.
<hr/>				
Post Boissier binominals				
366-A	paxiana	Dinter	1921	inadequately described.
266-B	stolonifera	Marloth	1929	
371-A	gracilior	Cronqu.	1949	Georgia
371-B	elastica	Dinter	1938	ex Range in Fedde 43:263.
372-A	spinea	N.E.Br.	1915	Cape.
373-A	suareziana	Croiz.	1934	
373-B	laro	Drake	1899	Madagascar
373-C	arbuscula	Balf.f.	1888	Socotra
373-D	intisi	Drake	1900	Madagascar
373-E	tennicaulis	Dinter	1938	ex Range Fedde 43:264.
376-A	sclerocyathium	Ekor.	1925	Transca. Pop.Kopet Dagh.
376-B	commiphoroides	Dinter	1909	G.W.Afr.
376-C	polyantha	Pax	1909	
378-A	guerichiana	Pax	1894	G.SW.Afr.
378-B	matabelensis	Pax	1900	Angola,Matabeleland
378-C	currori	N.E.Br.	1911	Angola,G.W.Afr.
378-D	gregaria	Marloth	1910	G.W.Afr.
378-E	frutiscens	N.E.Br.	1915	Cape.

Sect. XXIII. LYCIOPSISIS.

Folia sparsa subtasciculata, noralia opposita.  
 Stipulae nullae. Cymae terminales umbelliformes.  
 Glandulae exappendiculatae, pelviiformes. -- Frutex  
 gerontogenus.

379 cuneata Vahl. Arabia

Post Boissier binominals

379-A	bergeriana	Dinter	1914	- non E.bergeri W.E.Br.
379-B	jatrophioides	Pax	1904	Somali
379-C	halleri	Dinter	1937	not completely described
379-D	gossypina	Pax	1894	G.East Afr.
379-E	jaegeriana	Pax	1909	G.East Afr.
379-F	lycopsis	Pax	1895	Dschollasee
379-G	monocephala	Pax	1909	East Afr.
379-H	pimeleodendron	Pax	1911	G.E.Afr.
379-I	spinescens	Pax	1894	G.E.Afr.

Post Boissier trinominals

379-J	perrottetii	Boiss.	1863	Aden.
379-K	carpasus	Boiss.	1862	Abyssinia

Sect. XXIV. PSEUDACALYPHA.

Folia sparsa, floralia opposita. Stipulae nullae.  
 Cymae laterales, racemiformes. Glandulae exappendiculatae,  
 subbilabiatae. -- Herbae vel suffrutices Gerontogei.

380	acalyphoides	Hochst.	Nubia
381	systyla	Edgew.	Aden
382	crotonoides	Boiss.	1862 Nubia

Post Boissier binominals

381-A	systylodes	Pax	1894	Zanzibar	Jahrb.19:121
381-B	pseudo-holstii	Pax	1904		
382-A	pfeilii	Pax	1897	Afr.trop.	
382-B	caperonioides	Dyer, Mey.	1966	G.W.Afr.	
382-C	gynophara	Pax	1904	Parc Mt.	related to espinosa Pax.
382-D	espinosa	Pax	1894		
382-E	holstii	Pax	1894	G.E.Afr.	

Post Boissier trinominals

380-A	acalyphoides	Hochst. v. arabica	Boiss.	1862	Arabia
382-F	holstii v. habecarpa	Pax	1905	Brit.E.Afr.	

Sect. XXV. EUPHORBIASTRUM.

Folia omnia sparsa, floralia squamiformia. Stipulae nullae. Cymae axillares. Glandulae exappendiculatae, verticales truncatae. -- Frutex Americanus.

383 hoffmanniana Boiss. 1862 Costa Rica

NEW TAXA AND COMBINATIONS IN MACHAERIUM (LEGUMINOSAE). III.

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Among the poorly known species of Machaerium is M. ulei Harms, from Bahia, Brazil. The holotype, in Berlin, was destroyed but, fortunately, is represented by a fragment and photograph at F and by isotypes at G, K, L. Examination of these specimens has revealed dimorphic anthers, a character not known in Machaerium. In addition, superficially, M. ulei does not resemble any other species of the genus. Harms, himself, questioned its position in Machaerium.

Affinity with the genus Poecilanthus was considered but no known species could be matched. Dr. Roger Polhill kindly checked the type of P. parviflora Benth, at Kew, and excluded that as a likely synonym. Recently, among collections from Bahia sent to the New York Botanical Garden for determination, Dr. Mary Arroyo found two specimens that are identical to M. ulei. This additional material confirmed our suspicion that a new species of Poecilanthus was represented. The following transfer is, therefore, necessary:

POEILANTHUS ULEI (Harms) Arroyo & Rudd, comb. nov.

Machaerium ? ulei Harms, Engl. Bot. Jahrb. 42: 214. 1908.

Type: E. Ule 7248, Brazil, Bahia, "Strauch in der Cotinga bei Calderão, October 1906" (holotype B destroyed, represented by fragment F and F neg. 2292 ex B; isotypes G, K, L).

Additional collections: Brazil: Bahia: Ilheus, Centro de Pesquisas do Cacau, Belém & Magalhães 596 (NY), 630 (NY).

Another putative species of Machaerium, Drepanocarpus mucronulatus Benth ex Hemsley (Diagn. Pl. Nov. 8. 1878), non Machaerium mucronulatum Martius ex Benth, 1837, has been found to be Aeschynomene amorphoides (S. Watson) Rose ex Robinson, non Ae. mucronulata Benth, 1840. No new transfers are required. The holotype is at Kew, T. Coulter s. n. "Mexico: Bolaños, Guadalupe." "

Further study of the genus Machaerium indicates that several more taxa should be recognized or new combinations made, including two undescribed species indicated in preliminary manuscript or in the herbarium by the late Ellsworth P. Killip.

MACHAERIUM ACUTIFOLIUM Vogel var. PSEUDACUTIFOLIUM (Pittier) Rudd, comb. nov.

Machaerium pseudacutifolium Pittier, Bol. Soc. Ven. Cien. Nat. 7: 148. 1941. Type: H. Pittier 12484, Venezuela, Guárico, Mesa de El Sombrero, in savanna, 10 September 1927 (holotype VEN; isotypes A, G, M, MAD, NY, US).

MACHAERIUM ACUTIFOLIUM Vogel var. ENNEANDRUM (Hoehne) Rudd, comb. nov.

Machaerium enneandrum Hoehne, Arq. Bot. Estado S. Paulo, ser. nov. 1: 32. 1938. Type: J. G. Kuhlmann (Comissão de Linhas Telegráficas Estratégicas de Mato Grosso ao Amazonas no.) 424, Brazil, Mato Grosso, "Caminho para Porto Velho do Rio Arinos," November 1914 (holotype R).

MACHAERIUM BRASILIENSE Vogel var. ERIANTHUM (Bentham) Rudd, comb. nov.

Machaerium erianthum Bentham, Comm. Leg. Gen. 35. 1837 (pre-print); Ann. Wiener Mus. 2: 99. 1838. Type: J. E. Pohl s. n. or H. W. Schott s. n., Brazil, without exact locality (lectotype K ex herb. Bentham "Pohl"; isotypes F "Schott", F photo 2281 ex B "Pohl", K ex herb. Hooker without collector's name, NY "Schott", US "Schott", W "Schott"). All of these specimens appear to be of the same gathering. Unfortunately, according to Urban (in Martius, Fl. Bras. 1(1): 82. 1906), it is not always possible to know which sheets were collected by Pohl and which by Schott. Because Bentham cited Pohl as collector, the specimen formerly in his personal herbarium, so annotated, has been selected as lectotype.

MACHAERIUM CONZATTII Rudd, sp. nov.

Species lignea ut videtur M. cuspidato Kuhlmann & Hoehne sed floribus minoribus, indumento fulvo vel bruneo differt.

Tree ? shrub ? liana ? apparently unarmed; young stems fulvo-tomentulose; stipules deltoid, 3-5 mm. long, 1-3 mm. wide, puberulent, glabrescent; leaves 5-7-foliolate, the axis tomentulose, 9-13 cm. long; leaflets ovate to elliptic, 5-10 cm. long, 2.5-4.5 cm. wide, acuminate, rounded at the base, the surfaces tomentulose, the upper surface somewhat glabrescent, the venation penninreticulate, moderately conspicuous; inflorescences axillary and terminal, paniculate, the axes brown-tomentulose; bracts deltoid, acute, pubescent, 1-8 mm. long, 0.5-3 mm. wide; bracteoles pubescent, ovate, obtuse, 3 mm. long, 3 mm. wide; flowers 8-10 mm. long; calyx 5-6 mm. long, about 4 mm. in diameter, striate, tomentulose, the lobes obtuse, about 1 mm. long; petal color not known, the vexillum pubescent on the outer face; fruit not known.

Type: C. Conzattii & I. C. Gómez 3516, México, Oaxaca, Cuicatlan, Río Seco, 600 m. elev., 19 April 1919 (holotype US; isotype US).

MACHAERTIUM FLUMINENSE Rudd, sp. nov.

Arbor ? M. incorruptibili (Vellozo) Bentham affinis sed differt foliolis circa triplo majoribus longitudine et latitudine, floribus sericeis.

Tree ? apparently unarmed; young stems subglabrous; stipules (bud scales) deltoid, acute, 2.5 mm. long, 1.5 mm. wide at the base, caducous; leaves 11-15-foliolate, the axis about 8-15 cm. long, glabrous or puberulent; leaflets subcoriaceous, lanceolate-oblong, 3-6.5 cm. long, 0.5-1.5 cm. wide, acute, the base rounded to cuneate, the margin sometimes slightly revolute, the upper surface glabrous, the lower surface moderately puberulent with short, appressed or subappressed hairs, the venation penni-reticulate; inflorescences axillary, the axes fulvo-tomentulose; bracts deltoid, acute, 3-4 mm. long, 2 mm. wide; bracteoles semi-orbicular, obtuse, about 2 mm. long and wide; flowers about 8 mm. long; calyx fulvo-sericeous, 4 mm. long, 2.5 mm. in diameter, the teeth subacute, about 1 mm. long; petal color not known, probably purplish, the vexillum fulvo-sericeous on the outer face; fruit winged, fulvo-subsericeous, 6.5-9 cm. long including stipe about 5-8 mm. long, the body 1.5-2 cm. long, 1.2-1.5 cm. wide, the wing 5-6 cm. long, 2.5-3 cm. wide.

Type: A. Glaziov 5807, Brazil, Rio de Janeiro, Morro do Viração, 28 December 1871 (holotype P; isotypes G, K, P). Paratype: Brazil, "Rio Janeiro," Wilkes Expedition s. n. (US).

MACHAERTIUM FROESII Rudd, sp. nov.

Frutex scandens, M. amplo Bentham affinis sed floribus minoribus et foliolis numerosioribus differt.

Liana or scandent shrub, to about 30 m. high or more; young stems puberulent, glabrescent; stipules spinescent, indurated, reflexed, about 2-12 mm. long, 1-3 mm. wide at the base; leaves 13-27-foliolate, the axis 6-17 cm. long, puberulent, sometimes glabrescent; leaflets elliptic to elliptic-oblong, 1.5-3.5 cm. long, 0.7-1.5 cm. wide, obtuse or emarginate, the base rounded, the upper surface glabrous, the lower surface puberulent with lax hairs, usually glabrate at maturity, the venation crebrous; inflorescences terminal, paniculate, the axes puberulent, glabrescent; bracts deltoid, spinescent, 1-3 mm. long, 0.5-1.5 mm. wide; bracteoles elliptic to obovate, obtuse, puberulent, 1 mm. long or less, 1-1.5 mm. wide; flowers 7-9 mm. long; calyx 3-4 mm. long, 3 mm. in diameter, puberulent; petals lavender, pink, or whitish, the vexillum pubescent on the outer face; fruit (submature) winged, essentially straight, puberulent, glabrescent, 5-6.5 cm. long including stipe about 4-6 mm. long, the body 1.5 cm. long, 0.6 cm wide, the wing 3 cm. long, 1 cm. wide.

Type: R. L. Fröes 30380, Brazil, Pará, Monte Alegre, "margem da estrada de rodagem para a Colônia da Mulata", 25 September 1953 (holotype IAN no. 80526). Paratypes: Brazil: Pará; Faro, Ducke 3716 (BM). Amazonas: Manaus, Ducke 2138 (IAN, R); Rodrigues & Coelho 2400 (US).

MACHAERIUM HUANUCOENSE Rudd, sp. nov.

Species scandens, M. villosa Vogel ut videtur affinis sed differt floribus majoribus, foliolis paucioribus cum venis paucioribus et pube minus conferta.

Liana 8-9 m. long, apparently unarmed; young stems tomentulose, glabrescent, with prominent lenticels; stipules not seen; leaves 11-13-foliolate, the axis 15-17 cm. long, fulvo-tomentulose; leaflets subcoriaceous, ovate to lanceolate-elliptic, 4-11 cm. long, (1.5-) 2-3 cm. wide, acuminate, the base rounded to acute, the upper surface glabrous, the lower surface puberulent, the venation penni-reticulate with secondary veins about 10-12 pairs; inflorescences axillary or terminal, paniculate, the axes fulvo-tomentulose; bracts deltoid, acute, pubescent, 1-2 mm. long, 1-1.5 mm. wide; bracteoles pubescent, broadly ovate, obtuse, 1.5-2 mm. long and wide; flowers 8-11 mm. long; calyx fulvo-sericeous, 4 mm. long, 3 mm. in diameter, the lobes obtuse, 1 mm. long or less; petals pale purplish-pink, the vexillum sericeous on the outer face; ovary fulvo-villous; fruit not seen.

Type: J. Schunke V. 5895, Peru, Huanuco, west of Tingo María, 672 m. alt., 3 May 1962 (holotype US no. 2639619; isotype F).

Local name: Huasco barbasco.

MACHAERIUM MUTISII Killip ex Rudd, sp. nov.

Arbor, M. inundata (Martius ex Benth) Ducke affinis sed differt fructibus alatis, foliolis majoribus, plerumque indumento ferrugineo.

Tree, apparently unarmed; young stems tomentulose, glabrescent; stipules not seen; leaves 5-7-foliolate, the axis tomentulose, glabrescent, 11-15 cm. long; leaflets coriaceous, elliptic to ovate or obovate, 6-11.5 cm. long, 4-6.5 cm. wide, acuminate, the base rounded to acute, the upper surface glabrous, nitid, the lower surface glabrous or nearly so, the petiolules puberulent, the venation penni-reticulate; inflorescences axillary, the axes ferrugineo-tomentulose; bracts deltoid, acute, 1.5 mm. long, tomentulose; bracteoles ovate to suborbicular, obtuse, 1.5 mm. long, 1-1.5 mm. wide, tomentulose; flowers 8-10 mm. long; calyx ferrugineo-tomentulose, 4-4.5 mm. long, 3-3.5 mm. in diameter; petals purple, the vexillum pubescent on the outer face; fruit winged, essentially straight, or slightly bent, minutely ferrugineo-velutinous, 11-12 cm. long including stipe 5-10 mm. long, the body 2-2.5 cm. long, 1.5 cm. wide, the wing about 9 cm. long, 2 cm. wide.

Type: J. C. Mutis 4680, Colombia, without exact locality or date [possibly in the vicinity of Mariquita, Tolima] (holotype US no. 1561022; isotype MA). Paratypes: Colombia, without exact locality, Mutis 2338 (MA, US), 2927 (MA, US), 2932 (MA, US), 4298 (MA, US), 4678 (US).

MACHAERIUM PARVIFOLIUM Killip ex Rudd, sp. nov.

Arbor vel frutex scandens, M. seemannii Benthani affinis sed differt foliolis floribusque minoribus, fructibus aliquantum geniculatis.

Tree or liana, apparently unarmed; young stems ferrugineo-tomentulose, glabrescent; stipules not seen; leaves (7-) 11-15-foliolate, the axis 3.5-4.5 cm. long, tomentulose; leaflets coriaceous, lanceolate or lanceolate-ovate, obtuse, acute, or brev acuminate, the base rounded, 0.5-2.5 cm. long, 0.3-0.8 cm. wide, the upper surface glabrous, nitid, the lower surface pubescent along the midvein, otherwise essentially glabrous, the venation reticulate, inconspicuous; inflorescences axillary, racemose, the axes fulvo-tomentulose; bracts deltoid, acute, tomentulose, about 1 mm. long and wide; bracteoles broadly ovate, obtuse, about 1 mm long, 1.5 mm. wide, tomentulose; flowers 6 mm. long; calyx fulvo-tomentulose, 3 mm. long, 2.5-3 mm. in diameter, faintly striate; petal color not known, possibly white to purplish, the vexillum pubescent on the outer face; fruit winged, minutely fulvo-pilose, usually bent at 60-90° angle, 6.5-7 cm. long including stipe 6-7 mm. long, the body about 2-2.5 cm. long, 1 cm. wide, the wing 4-5 cm. long, 1.5-1.8 cm. wide.

Type: J. Cuatrecasas 16081, Colombia, El Valle, Pacific Coast between El Aguacate and Quebrada de la Yuca, 10-40 m. alt., 8 February 1944 (holotype US no. 1853372; isotype F). Paratypes: Colombia: El Valle: La Trojita, Río Calima, Chocó region, 5-50 m. alt., Cuatrecasas 16260 (US). Santander: Barrancabermeja, highway to El Centro, 130 m. alt., Uribe 3974 (COL).

MACHAERIUM SUBRHOMBIFORME Rudd, sp. nov.

Arbor vel frutex scandens ut videtur M. inundato (Martius ex Benthani) Ducke, M. seemannii Benthani, etc. affinis sed foliolis subcoriaceis, subrhombiformibus, acuminatis differt.

Subscandent shrub or tree, about 5 m. tall; young stems puberulent; stipules not seen; leaves 7-foliolate, the axis 10-12 cm long, puberulent with subappressed hairs; leaflets subcoriaceous, subrhombiform, 5-9.5 cm. long, 2-4 cm. wide, acuminate, the acummen 1-1.5 cm. long, the base cuneate, the upper surface glabrous, the lower sparsely appressed-pubescent, especially along the midvein, otherwise glabrous, the venation penni-reticulate, inconspicuous; inflorescences axillary, paniculate, the axes pallid-sericeous; bracts pubescent, ovate, somewhat cucullate, 1-2 mm. long, 1.5 mm. wide, acute; bracteoles broadly ovate, obtuse, pallid-sericeous, 1.5 mm. long and wide; flowers 8-9 mm. long; calyx pallid-sericeous, striate, about 4 mm. long, 3 mm. in diameter, the lobes obtuse, about 0.5 mm. long; petals white and lavender, the vexillum sericeous on the outer face; fruit not known.

Type: J. Steinbach 6772, Bolivia, Santa Cruz, Sara, "bosques del río Quimori", 400 m. elev., 19 December 1924 (holotype F no. 563844; isotypes A, BM, G, GOET, K, MO, S, UC, W).

MACHAERTIUM CUZCOENSE Rudd, sp. nov.

Arbor, aspectu M. millei Standley sed differt stipulis spinulentibus, floribus majoribus et fructibus latioribus cum stipite brevior.

Tree, about 4 m. tall; young stems tomentulose, glabrescent; stipules spinulent, recurved, about 4 mm. long, 2 mm. wide at the base; leaves 13-15-foliolate, the axis 10-12 cm. long, fulvo-tomentulose; leaflets elliptic to elliptic-oblong, 2-5 cm. long, 1-2 cm. wide, the apex subacute, the base cuneate to rounded, the upper surface puberulent, the lower surface tomentulose, densely so along the midvein, the venation penni-reticulate; inflorescences axillary, racemose, the axes fulvo-tomentulose; bracts and bracteoles caducous, not seen; flowers about 8 mm. long; calyx fulvo-tomentulose, 3 mm. long, 3 mm. in diameter, the lobes obtuse, about 1 mm. long; petal color not known, the vexillum pubescent on the outer face; fruit winged, puberulent at the base, otherwise glabrous, bent almost to a right angle, about 6-6.5 cm. long including stipe 7-8 mm. long, the body about 2 cm. long, 1-1.3 cm. wide, the wing about 3.5 cm. long, 1.8-2 cm. wide.

Type: R. Chavez 423, Peru, Cuzco, Convención, Rosario Mayo, in sub-xerophytic habitat, 1300 m. alt., 28 January 1969 (holotype F no. 1671469).

MACHAERTIUM URIBEI Rudd, sp. nov.

Species scandens, M. bondaensi Pittier et M. capote Triana ex Dugand affinis sed differt floribus fructibusque majoribus.

Liana climbing on tall trees, apparently unarmed; young stems tomentulose; stipules (bud scales) deltoid, 3 mm. long, 2.5 mm. wide, acute; leaves 19-23-foliolate, the axis tomentulose, 12-15 cm. long; leaflets elliptic to elliptic-oblong, 2-5 cm. long, 1-2 cm. wide, acute to obtuse, the base rounded, the surfaces puberulent, glabrescent, the venation penni-reticulate; inflorescences racemose, the axes fulvo-tomentulose; bracts deltoid, pubescent, about 3-4 mm. long, 2.5-3 mm. wide at the base; bracteoles caducous, not seen; flowers probably about 8-9 mm. long; calyx tomentulose but glabrescent at the base, 4 mm. long, 3 mm. in diameter, the teeth deltoid, about 1 mm. long; petals not seen; stamens 7-8 mm. long, apparently diadelphous 5:5, the anthers elliptic, about 0.5 mm. long; fruit winged, puberulent and somewhat setose, glabrescent, 7-8 cm. long including stipe 5-6 mm. long, the body about 2 cm. long, 0.9-1.0 cm. wide, the wing 4.5-5.5 cm. long, 1.5-1.8 cm. wide.

Type: L. Uribe Uribe 1572, Colombia, Cundinamarca, Pacho, Hacienda "Fatasia", about 1700 m. alt., 26 May 1947 (holotype US no. 1901280).

### TRIBAL REVISIONS IN THE ASTERACEAE. III.

#### A NEW TRIBE, LIABEAE

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Attempts to establish more natural concepts for the Compositae have revealed two genera, Liabum from the Senecioneae and Cacosmia from the Helenieae, which are very closely related to each other and which are rather remote from all other genera. The two genera are placed here in a new tribe having closest relationship to the Vernonieae.

The exclusively Western Hemisphere group of plants was noted first by Linnaeus on the basis of a West Indian species under Amellus a genus of the tribe Astereae. Separate generic status was first established with the description of Liabum by Adanson in 1763. The first significant attempts to classify members of the group were those of Kunth and Cassini in the early 19th century. Kunth (1818) recognized Liabum under the new genus Andromachia and included the genus in his subsection Astereae of the section Carduaceae. The subsection included primarily genera now placed in the tribe Astereae. Cacosmia, described as new in the work, was placed in the section Heliantheae. Cassini (1819) reviewed the work of Kunth in detail and redistributed the genera into his previously established tribes. Andromachia was recognized as a synonym of Liabum and placed in the Vernonieae. Cacosmia was also placed in the Vernonieae with the comment, "Cacosmia est une vernoniée voisine de l'Andromachia!" Later Cassini (1825) recognized five sections in the Vernonieae with the first, the Liabeae containing Munnozia Ruiz & Pav., Liabum Adanson, Oligactis Cass. and Cacosmia Kunth.

The concepts of Cassini prevailed for fifty years but Bentham (1873) placed Liabum in a distinct subtribe of the tribe Senecionideae. He said, "Liabeae is a small subtribe characterized by its imbricate involucre and Vernonioid style" and he added, "It has been almost universally classed under Vernoniaceae on account of its style; but the yellow heterogamous usually radiate capitula as well as the habit are very foreign to that tribe, whilst there is much that connects it with Senecionideae. The opposite leaves, though not common in the latter tribe, are to be met with in Arnica, Haploestes, and Gynoxys; and the style is scarcely so far removed from that of Gynura as the latter from the ordinary truncate style of Senecio. The W.-Indian and Columbian genus Neurolaena, two species, admitted on all sides to be a Senecionid, is very nearly allied to Liabum, and, indeed, closely connected with it through Schistocarpha, a Mexican and Peruvian genus of four species, with the opposite leaves of Liabum and the paleaceous receptacle of Neurolaena." Bentham placed Cacosmia in a subtribe Jaunieae of the Helenioideae with the comment "There remain four genera,

which, on account of their involucre bracts, imbricate in several rows, increasing from the outer to the inner, are anomalous in the Helenioideae, . . ."

The concepts of Bentham were followed by Hoffman (1894) and as such by all subsequent treatments. The Bentham - Hoffman concept seems to have been based primarily on an erroneous belief that nothing with ray flowers and opposite leaves should be closely related to the Vernoniaceae and also on a very unnatural broad concept of the Senecioneae. The concept presented here recognizes Cassini's basic insight into the closest relationships of Liabum but also recognizes Bentham's wisdom in removing the group from the otherwise very natural and well defined tribe Vernoniaceae.

Liabeae, tribus nova Asteracearum. Folia opposita subtus plerumque albo-tomentosa. Capitula heterogama; squamae involucri multiseriatae; radii sine antheris; corollae flavae; thecae antherarum inferne distincte prolongatae, cellulis exothecialibus quadratis vel elongatis distincte paucae vel multo noduliferis, appendicibus planis non glanduliferis intus simplicibus; styli florum discoideorum in nectariis partim immersi, ramis oblongis vel linearibus extus valde hirsutis intus anguste vel late continue stigmaticis. Grana pollinis regulariter vel irregulariter spinulifera non reticulifera.

Genus typicum: Liabum Adanson

The two most basic structures reflecting relationships within the Asteraceae are the styles and the stamens. In both of these structures the Liabeae are closely related to the Vernoniaceae and comparatively remote from other tribes. The style of the disk flowers has hairs on the outer surface to below the base of the branches and has a stigmatic surface of completely fused lines running along the inner surface of the branches to the tip. Such a combination of style branch and stigmatic line structure is approached but not equalled by a few members of the Eupatoriaceae. The stamen has the functional thecae extending well below the level of attachment and usually completely overlapping the collar. The anther appendage is broad and flat without concavity or costa. Evidence for relationship can also be gained from the multiseriate graduated form of the involucre, the long narrow shape of the corolla lobes, the pappus with usually two distinct series, and the tendency for irregular spine positions on the pollen.

Actual placement of Liabum and Cacosmia in the Vernoniaceae seems unwise on the basis of present knowledge. The opposite leaves, the presence of rays, and the yellow color of the corollas noted by Bentham and Hoffman are very significant differences. The lack of reticulating ridges on the pollen grains is also very important. In addition, there are tendencies in the Liabeae toward longer exothecial cells with terminal thickenings, a form unknown in the Vernoniaceae, and the anther appendages are generally firmer and sometimes hollow in a manner

known elsewhere only in the Eupatorieae.

The relegation of Liabum in the Senecioneae was rather obviously unnatural. Separate observations to this effect had been mentioned to the senior author some years ago by both R.M. King and Jose Cuatrecasas. The observations of the latter were based on extensive detailed study of the compositae in general and the Senecioneae in particular, and the true relationships of Liabum and Cacosmia were as fully suspected by Dr. Cuatrecasas as they were by Cassini. In contrast, the basis of Bentham's placement of the genera in the Senecioneae and Helenieae seems weak, and the primary motive must have been to exclude the genera from the Vernonieae. In both cases the Vernonia-type multiseriate involucre has proved an embarrassment, the Helenieae and Senecioneae both being characterized by simpler involucre. Bentham's comparison of the Liabum style branch with that of Gynura showed no insight into the basic differences in the form and placement of the stigmatic lines and the development of stylar appendages in the Senecioneae. The Bentham concept washes out completely with the realization that neither Neuro-laena nor Schistocarpus which he considered intermediate are members of the Senecioneae. The true relationships of the latter are analyzed in a following paper of this series.

The relationship of Cacosmia with Liabum cannot be seriously questioned. The former does have generally smaller heads and the flowers lack a pappus, but there are no other consistent differences. The vegetative portions of the plants are essentially identical. The development of true ray flowers lacking anthers and with modified non-hirsute styles is the same in both genera. Corolla lobes completely lacking stomates as in Cacosmia are found in a large group of Liabum species. Short exothecial cells with thickenings on all walls as in Cacosmia are found in four species of Liabum.

The proper placement of the Liabeae is of undoubted significance to understanding the overall evolution of the Asteraceae. The removal from the Senecioneae further diminishes the already fading belief that the tribe might be the oldest and most diverse in the family. The realization that two genera with fully differentiated rays are closely related to the Vernonieae is obviously important in evaluating the relative position of that tribe.

We wish to acknowledge R. M. King for calling special attention to some of the pertinent references of Cassini and Bentham.

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ADDITIONAL NOTES ON THE GENUS AEGIPHILA. XIX

Harold N. Moldenke

AEGIPHILA BARBADENSIS Moldenke

This taxon is now more correctly called A. martinicensis f. barbadensis (Moldenke) Moldenke, which see.

AEGIPHILA CEPHALOPHORA Standl.

Additional bibliography: Moldenke, *Phytologia* 25: 295--296, 302, & 321. 1973.

Additional citations: PANAMA: Barro Colorado Island: R. Foster 2358 (Mi).

AEGIPHILA CHRYSANTHA Hayek

Additional bibliography: Moldenke, *Phytologia* 25: 294 & 296--297. 1973.

Additional citations: BRAZIL: Pará: Silva & Souza 2262 (N).

AEGIPHILA DEPPEANA Steud.

Additional bibliography: Moldenke, *Phytologia* 25: 295, 296, & 301--303. 1973.

Additional citations: MEXICO: Veracruz: Ventura A. 3382 (Mi).

AEGIPHILA ELATA Sw.

Additional bibliography: Moldenke, *Phytologia* 25: 303--308. 1973.

Recent collectors describe this plant as climbing over shrubs, its older leaves dark-green, the calyx green, the anthers brown, and the fruit orange or bright-orange and juicy. The corollas are described as "yellow" on Avery 411, while on Stearn 492 they were "primrose-yellow, lobes spreading". The plant has been found growing on steep slopes, flowering in December (in addition to the months previously reported).

Additional citations: PANAMA: Barro Colorado Island: R. Foster 1240 (Mi). JAMAICA: Stearn 492 [Proctor 11774] (Ba). CULTIVATED: Florida: Avery 411 (Ba).

AEGIPHILA INTEGRIFOLIA (Jacq.) Jacks.

Additional bibliography: Moldenke, *Phytologia* 25: 293, 318, & 322--325. 1973.

The Aublet specimen photographed by Meyer at the British Museum (Natural History) in London is the type of Manabea arborescens Vahl. The Breteler 4512 and López Palacios 2749 & 2992, distributed as A. integrifolia, seem actually to represent what is at present known as A. guianensis Moldenke. It is possible that the latter ought to be reduced to varietal status under A. integrifolia. This is a matter best decided by a local botanist well

acquainted with both taxa in the field.

Additional & emended citations: PANAMA: Darién: Stern, Chambers, Dwyer, & Ebinger 663 (E--1757558). TRINIDAD & TOBAGO: Trinidad: W. E. Broadway 5838 (E--928341), 6682 (E--972998, F--689811, W--1343508), s.n. [Aug. 1918] (W--1047589); Eggers 1364 (W--1323269); Huggins s.n. [Herb. Trin. Bot. Gard. 2385] (W--1323270, W--1323271). COLOMBIA: Boyacá: Lawrance 548 (E--1039303, Se--193328). Méta: Dawe 284 (W--1423140). Putumayo: Schultes & Smith 2027 (Ws). Santander: Romero Castañeda 4871 (N). Department undetermined: Triana 375 (W--1481129). VENEZUELA: Amazonas: Holt & Gehriger 270 (W--1471980); Spruce s.n. [April 1850] (F--686367); Steyermark & Bunting 102796 (N). Anzoategui: Aristeguieta 4714 (N). Aragua: Agostini & Farifas 107 (N). Barinas: Steyermark & Rabe 96600 (Rf). Bolívar: Lasser 1604 (N). Monagas: Aristeguieta, Liogier, & Cárdenas de Guevara 7189 (Au). Sucre: Steyermark & Rabe 96092 (N, Rf). Táchira: Breteler 4905 (W--2583290a, W--2583291a). Zulia: Pittier 10626 (W--1187271); Steyermark & Fernández 99702 (Rf); Tejera 119 (W--1066090), 124 (W--1066083). GUYANA: Gleason 203 (W--1190891), 313 (W--1190942); M. R. Schomburgk 404, in part (F--533221, F--686462, W--702680). FRENCH GUIANA: Aublet s.n. [F. G. Mey. photo 4067] (N--photo). ECUADOR: Napo-Pastaza: Mexia 7173 (Ar--13884), 7187 (Ar--13893), 7289 (Ar--13953). PERU: Huánuco: J. F. Macbride 5053 (F--536095, W--1495210); Schunke V. 1796 (N). Junín: Killip & Smith 22799 (W--1356272), 26329 (F--616137, W--1356656). Loreto: Killip & Smith 27343 (F--612031, W--1460285); Klug 108 (F--624075, W--1455107); Ll. Williams 2583 (F--612916). Puno: Vargas C. 16083 (Ws). San Martín: Klug 3468 (E--1082340). BRAZIL: Amazonas: Prance, Coêlho, Harley, Kubitzki, Maas, Sastre, & Smith 11680 (N, Rf); Ule 7861 (W--1615339). Minas Gerais: Mexia 4203 (D--708193, E--1023294, W--1516798), 4500 (D--708138, E--1022866, W--1544141). São Paulo: Curran 9 (W--920332). BOLIVIA: El Beni: Buchtien 5533 (W--1159349). La Paz: M. Bang 584 (E--117697, F--77495, W--55750, W--1416743); Buchtien 719 (E--973231, F--588749, W--1159336); M. Cárdenas 2065 (W--1232481). Santa Cruz: J. Steinbach 754 (E--940708, F--573462), 5498 (F--550392); R. F. Steinbach 776 (S).

#### AEGIPHILA INTERMEDIA Moldenke

Additional & emended bibliography: Moldenke, *Brittonia* 1: 268, 341--342, & 473. 1934; A. W. Hill, *Ind. Kew. Suppl.* 9: 6. 1938; Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 568. 1941; Moldenke, *Inform. Mold. Set 51 Spec.* [1]. 1956; Moldenke, *Phytologia* 13: 328--329. 1966; J. A. Steyer., *Act. Bot. Venez.* 1: 101. 1966; Moldenke, *Résumé Suppl.* 16: 5. 1968; Moldenke, *Fifth Summ.* 1: 114, 121, & 145 (1971) and 2: 846. 1971.

Recent collectors describe this plant as a shrub or tree, 2—3 m. tall, with orange fruit, frequent in open forests. They have found it flowering in August and September, and fruiting in August. The corollas are said to have been "white" on Silva & Souza 2594 and "whitish at base" on Murça Pires & Cavalcante 52652. Fedde & Schuster (1941) cite the type collection of this species as "E. A. Goeldi n. 2270".

Additional & emended citations: BRAZIL: Amapá: Murça Pires & Cavalcante 52652 (N, Rf). Amazonas: Ducke 136 (W--1693145). Pará: Silva & Souza 2322 (N, Rf), 2594 (N).

#### AEGIPHILA KILLIPII Moldenke

Synonymy: Aegiphila killipii Moldenke, *Phytologia* 1: 292, syn. in textu (1938) and *Prelim. Alph. List Invalid Names* 2, in syn. 1940.

Additional bibliography: A. W. Hill, *Ind. Kew. Suppl.* 9: 6. 1938; Fedde & Schust. in *Just, Bot. Jahresber.* 60 (2): 568. 1941; Moldenke, *Phytologia* 7: 481. 1961; Moldenke, *Fifth Summ.* 1: 114 & 380 (1971) and 2: 846. 1971.

#### AEGIPHILA LAETA H.B.K., *Nov. Gen. & Sp. Pl.*, ed. folio, 2: 202. 1817.

Synonymy: Aegiphila laeta Humb. & Bonpl. ex Steud., *Nom. Bot.*, ed. 1, 1: 16. 1821. Aegiphila laeta Humb. ex Spreng. in *L., Syst. Veg.*, ed. 16, 1: 422, in syn. 1825. Aegiphyla laeta Humb. & Bonpl. ex Steud., *Nom. Bot.*, ed. 2, 1: 29. 1840. Aegiphila laeta Kunth ex Schau. in *A. DC., Prodr.* 11: 652. 1845. Aegiphila stricta Rusby, *Descr. 300 New Spec. S. Am. Pl.* 107. 1920. Aegiphila stricta var. ? Rusby, *Descr. 300 New Spec. S. Am. Pl.* 108. 1920.

Additional & emended bibliography: H.B.K., *Nov. Gen. & Sp. Pl.*, ed. folio, 2: 202 (1817) and ed. quarto, 2: 249. 1818; Bocq., *Rév. Verbenac.* 190. 1863; Jacks. in *Hook. f. & Jacks., Ind. Kew.*, pr. 1, 1: 46. 1893; A. W. Hill, *Ind. Kew. Suppl.* 6: 6. 1926; Jacks. in *Hook. f. & Jacks., Ind. Kew.*, pr. 2, 1: 46 (1946) and pr. 3, 1: 46. 1960; Moldenke, *Phytologia* 13: 329. 1966; Moldenke, *Résumé Suppl.* 16: 3 & 14 (1968) and 17: 2. 1968; Moldenke, *Fifth Summ.* 1: 89, 92, 114, 121, 380, 382, & 384 (1971) and 2: 846. 1971.

Recent collectors describe this species as an herb (!), shrub, 1.5—3 m. tall, small tree, or even a tree almost 12 m. tall (!), the leaves membranous, dull-green on both surfaces, and the fruit yellow or orange and tasteless. They have encountered it growing in thickets and along old logging roads, at altitudes of 270—290 meters, flowering from August to October. The corollas are said to have been "cream to white" on Correa & Dressler 351, "greenish-yellow" on I. M. Johnston 56, and "dull-green" on Steyermark & Fernández 99702. Material has been misidentified and distributed in some herbaria as A. pendula Moldenke.

It should be noted here that the H.B.K. reference dates given in the emended bibliography above have been authenticated by Barnhart

(1902).

Additional & emended citations: PANAMA: Canal Zone: Correa & Dressler 351 (E-1928198). Darién: Duke 4116 (E-1786136), 8827 (E-1841249, Oh). Panamá: Duke 4762 (E-1785608, E-1983547). San Blas: Duke & Bristan 348 (Ac). Nakka Island: Dwyer 6871 (E-1824747). PEARL ISLANDS: San José: I. M. Johnston 56 (E-1590822). COLOMBIA: Atlántico: Dugand G. 1149 (F-928166). Magdalena: H. H. Smith 330 (D-599290, E-117684, F-137392, W-703770). Santander: Killip & Smith 14971 (W-1350930). VENEZUELA: Lará: Saer 602 (F-689840). Zulia: Steyermark & Fernández 99702 (N).

## AEGIPHILA LAEVIS (Aubl.) Gmel.

Additional & emended synonymy: Manabea laevis Aubl., Hist. Pl. Guian. 1: 66-68. 1775. Aegiphila laevis Aubl. ex J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 259. 1789 [not A. laevis Griseb., 1864, nor Poepp., 1845]. Aegiphila lutea Lam., Tabl. Encycl. Méth. Bot. pl. 70, fig. 3. 1791 [not A. lutea Poepp., 1940]. Aegiphila manabea Sw., Fl. Ind. Occ. 1: 256-257. 1797. Aegiphila laevis Willd., Linn. Sp. Pl. 1: 616-617. 1797. Manabaea laevis Aubl. ex Steud., Nom. Bot., ed. 1, 1: 16, in syn. 1821. Aegiphyla laevis Willd. ex Steud., Nom. Bot., ed. 2, 1: 29. 1840. Aegiphyla lutea Lam. ex Steud., Nom. Bot., ed. 2, 1: 29, in syn. 1840. Aegiphyla manabaea Sw. ex Steud., Nom. Bot., ed. 2, 1: 29, in syn. 1840. Aegiphila laevis Vahl ex Schau. in Mart., Fl. Bras. 9: 286 [as "Aeg. laevi Vahl"]. 1851. Aegiphila laevis Juss. ex Bocq., Adansonia 3: 190. 1862. Aegiphila manabaea Sw. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46, in syn. 1893. Aegiphila laevis Bocq. ex Urb., Symb. Ant. 8: 600. 1920. Aegiphila levis (Aubl.) Gmel. ex Moldenke, Brittonia 1: 389, sphalm. 1934 [not A. levis Wright, 1959]. Aegiphila lavis Vahl ex Moldenke, Phytologia 1: 229, syn. in textu (1937); Prelim. Alph. List Invalid Names 2, in syn. 1940. Aegiphila laevis f. angustifolia Wulfschl. ex Moldenke, Prelim. Alph. List Invalid Names [1], in syn. 1940. Aegiphila levis Vahl ex Moldenke, Prelim. Alph. List Invalid Names 2, in syn. 1940. Manabea levis Aubl. ex Moldenke, Prelim. Alph. List Invalid Names 32, in syn. 1940. Aegiphila sarmentosa L. C. Rich. ex Moldenke, Prelim. Alph. List Invalid Names 3, in syn. 1940. Aegiphila longifolia Willd. ex Moldenke, Suppl. List Invalid Names [1], in syn. 1941 [not A. longifolia Turcz., 1863]. Aegiphila laevis (Jacq.) Gmel. ex Moldenke, Alph. List Invalid Names Suppl. 1: [1], in syn. 1947.

Additional & emended bibliography: Aubl., Hist. Pl. Guian. 1: 66-68. 1775; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 259. 1789; Lam., Tabl. Encycl. Méth. Bot. 1: pl. 70, fig. 3 (1791) and 1: 294. 1792; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 2, 2: 259. 1796; Raeusch., Nom. Bot., ed. 3, 37. 1797; Sw., Fl. Ind.

Occ. 1: 256—257. 1797; Willd., Linn. Sp. Pl. 1: 616—617. 1797; Rulf & Pav., Fl. Peruv. & Chil. 1: 50. 1798; Turton in Gmel., Gen. Syst. Nat. 5: 219. 1802; Pers., Syn. Pl. 1: 132. 1805; H. C. Andr., Bot. Rep. 9: 578. 1809; Poir., Encycl. Méth. Suppl. 1: 150. 1810; Pers., Sp. Pl. 1: 339. 1817; Roem. & Schult. in L., Syst. Veg., ed. 15 nova [Stuttg.], 3: 101—102 & [535]. 1818; Steud., Nom. Bot., ed. 1, 1: 16. 1821; Willd., Nom. Bot., ed. 2, 82. 1821; Spreng. in L., Syst. Veg., ed. 16, 1: 422. 1825; Cham., Linnaea 7: 110. 1832; D. Dietr., Syn. Pl. 1: 429. 1839; Steud., Nom. Bot., ed. 2, 1: 29. 1840; Walp., Repert. 4: 119—120. 1845; Schau. in A. DC., Prodr. 11: 652. 1847; R. Schomb., Reis. Brit.-Guian. 3: [Vers. Fauna & Fl. Brit.-Guian.] 1150. 1848; Jacques & Hérincq, Man. Gen. Pl. Arb. & Arbust. [Fl. Jard. Eur. 3:] 504. 1850—1853; Schau. in Mart., Fl. Bras. 9: 286. 1851; Bocq., Adansonia 2: 117 (1862) and 3: 190. 1863; Bocq., Rév. Verbenac. 117 & 190. 1863; Griseb., Fl. Brit. W. Ind. 499—500. 1864; Pritz., Icon. Bot. Ind. 1: 23. 1866; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46 (1893) and pr. 1, 2: 160. 1894; Ann. Inst. Col. Mars. 3: 466. 1896; Duss, Fl. Ant. Franç. 466. 1897; Pulle, Enum. Vasc. Pl. Surinam. 403. 1906; Hayek in Engl., Bot. Jahrb. 42: 172. 1909; Urb., Symb. Ant. 8: 600. 1920; N. L. Britton, Bull. Torrey Bot. Club 50: 54. 1923; Stapf, Ind. Lond. 1: 79 (1929) and 4: 217. 1930; Moldenke, Phytologia 1: 229—230 (1937), 1: 292—293 (1938), 1: 391 (1940), and 2: 90. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 46 (1946) and pr. 2, 2: 160. 1946; Moldenke, Phytologia 2: 399. 1947; F. C. Hoehne, Ind. Bibl. Num. Pl. Com. Rondon 346. 1951; Moldenke, Phytologia 5: 95. 1954; Cuatrecasas, Revist. Acad. Colomb. Cienc. 10: 236 & 244. 1958; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 46 (1960) and pr. 3, 2: 160. 1960; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 709. 1960; Moldenke, Phytologia 13: 329. 1966; Moldenke, Résumé Suppl. 16: 14. 1968; Moldenke, Fifth Summ. 1: 114, 121, 128, 131, 132, 145, 380—382, 384, & 385 (1971) and 2: 570 & 846. 1971; Moldenke, Phytologia 25: 296 & 304—306. 1973.

It should be noted here that Lamarck's 1791 work is often cited as "Lam. Illustr. 1505. t. 70. f. 1", but this is using a subtitle of the work and a species number, rather than the true title and a page number. Common names for the species, sometimes listed, are "aegiphile jaune" and "spreading aegiphila". The A. laevis Griseb., referred to in the synonymy above, is actually a synonym of A. laxiflora Benth., while A. laevis Poepp. is A. elata Sw., A. lutea Poepp. is A. chrysantha Hayek, and A. levis Wright is A. elata Sw.

Recent collectors describe this plant as a liana, a creeping shrub, or a straggling shrub, growing in sandy soil on riverbanks or at the margins of dry or wet forests, at 450 meters altitude, flowering in January, March, September, and December. The corollas are said to have been "pale-yellow" on Lindeman 5445 and "cream" on Philcox & Ferreira 4620 and Philcox, Ferreira, & Bertoldo 3590. The Feddema 2001, distributed as A. laevis, is actually something in the Rubiaceae.

Additional citations: VENEZUELA: Bolívar: Bernardi 893 (N).

SURINAM: Kappler s.n. (S); Lindeman 5445 (N). FRENCH GUIANA: Aublet s.n. (N--photo of type); Lamarck s.n. [Herb. Poirét] (P). BRAZIL: Mato Grosso: Philcox & Fereira 4620 (N); Philcox, Fereira, & Bertoldo 3590 (N).

#### AEGIPHILA LANATA Moldenke

Synonymy: Aegiphila lanta Moldenke, Suppl. List Invalid Names [1], in syn. 1941.

Additional & emended bibliography: Moldenke, Brittonia 1: 259, 267, 330, 331, 345--346, & 473. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Suppl. List Invalid Names [1]. 1941; Moldenke, Phytologia 13: 329. 1966; Moldenke, Fifth Summ. 1: 145 & 380 (1971) and 2: 846. 1971.

Irwin and his associates describe this plant as an erect subshrub, 1 m. tall, with several stems, the immature fruit green, dark-, or gray-green, maturing red, frequent in cerrado or burned-over cerrado, on rocky slopes, and in campos with a few low shrubs, at 975--1125 m. altitude, flowering in February, September, and November, fruiting in February, March, and December. The corollas are said to have been "white" on Irwin, Souza, & Reis dos Santos 10622 and "cream" on Irwin, Grear, Souza, & Reis dos Santos 13157.

Additional & emended citations: BRAZIL: Distrito Federal: Irwin, Grear, Souza, & Reis dos Santos 13149 (Ac, N), 13157 (N, Rf); Irwin, Souza, & Reis dos Santos 8540 (Ac, N), 10622 (Ac, N), 11126 (N, Rf). Goiás: Cobre & Sucre 309 (N); Glaziou 21917 (W--1110410--isotype); Irwin, Grear, Souza, & Reis dos Santos 13399 (Ac, N).

#### AEGIPHILA LANCEOLATA Moldenke

Emended synonymy: Aegiphila ferruginea Glaz., Bull. Soc. Bot. France 58 [sér. 4, 11], Mém. 3: 546. 1911 [not A. ferruginea Hayek & Spruce, 1909].

Additional & emended bibliography: Prain, Ind. Kew. Suppl. 5, pr. 1, 6. 1921; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Prain, Ind. Kew. Suppl. 5, pr. 2, 6. 1960; Moldenke, Phytologia 13: 329. 1966; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: i & 827. 1970; Moldenke, Fifth Summ. 1: 145, 184, 194, 354, & 379 (1971) and 2: 846. 1971; Moldenke, Phytologia 25: 294 & 310. 1973.

Recent collectors describe this species as a small tree, 4--8 m. tall, a semi-scandent or leaning bush, or a woody climber to 10 m. tall, with long branches, the trunk 5--10 cm. in diameter at the base, the corollas caducous, and the fruit orange-red and shiny. They have found it growing on low campos, in high woods, and in clearings in the rainforest. It has been collected in anthesis in January, April, and December, and in fruit in January and July. The corolla is said to have been "yellow" on Woolston

1046 & 1059. Material has been misidentified and distributed in some herbaria as A. candelabrum Briq.

Actually, it seems very possible to me that A. lanceolata would better be regarded as a variety of A. vitelliniflora Klotzsch, but more field work is needed to compare the two taxa in the living state.

Additional & emended citations: BRAZIL: Paraná: Hatschbach & Guimarães 19047 (N). Rio de Janeiro: J. E. Pohl 553 (F--605869). PARAGUAY: Fiebrig 6241 (W--1159388--type); Woolston 844 (N, N, S), 1046 (N, S, S), 1059 (N, S, S). ARGENTINA: Misiones: Bertoni 1264 (N).

#### AEGIPHILA LAXICUPULIS Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 13: 329--330 & 332. 1966; Gibson, Fieldiana Bot. 24 (9): 169, 172, & 173, fig. 31. 1970; Moldenke, Fifth Summ. 1: 78, 84, 85, & 380 (1971) and 2: 846. 1971; Moldenke, Phytologia 23: 415. 1972.

Illustrations: Gibson, Fieldiana Bot. 24 (9): 173, fig. 31. 1970.

Gibson (1970) reduces A. magnifica Moldenke to synonymy under A. laxicupulis, saying "Although the type specimen of A. magnifica has larger leaves than some specimens of A. laxicupulis, Moldenke's two species differ in no other respect if one may judge from specimens determined by him. Whether or not the calyx closely invests the fruit seems to depend upon the stage of growth and development of the plant. A. laxicupulis has also been confused by Moldenke and others with A. paniculata Moldenke, a tree of the lowlands of southern Central America and South America, which differs in its patelliform fruiting calyces that are only 2--2.5 mm. long. As I am unable to separate flowering material of any of these taxa from that of A. martinicensis Jacq., perhaps they should all be placed there; however, the fruiting calyces of A. martinicensis are lobate." She gives the geographic distribution of A. laxicupulis in this, her expanded new circumscription, as "Damp thickets and second growth woods, 330--1,050 meters; Chiquimula; Escuintla; Quezaltenango; Santa Rosa; Suchitepéquez. Honduras; Nicaragua; Costa Rica." Molina R. refers to it as a "common shrub, 2--3 m. tall in wet thickets along river" and found it fruiting in November.

Additional & emended citations: GUATEMALA: Santa Rosa: Heyde 191 (W--246324--type); Heyde & Lux 4041 (W--207299, W--1323299). EL SALVADOR: Ahuachapán: Padilla 80 (E--896369, W--1152478). Cuscatlan: Calderón 1934 (W--1206521). La Paz: Choussy 12 (W--1152653). San Vicente: Calderón 1184 (W--1152160). NICARAGUA: Estelí: A. Molina R. 22996 (N).

AEGIPHILA LAXIFLORA Benth.

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46. 1893; A. W. Hill, Ind. Kew. Suppl. 7: 6. 1929; Moldenke, Brittonia 1: 252, 273, 275, 389—391, 393, 395—397, 400, & 472—476. 1934; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 46 (1946) and pr. 3, 1: 46. 1960; Moldenke, Phytologia 13: 330. 1966; Moldenke, Fifth Summ. 1: 111, 121, 129, 380, & 383 (1971) and 2: 846. 1971; Moldenke, Phytologia 25: 304 & 305. 1973.

The Steyermark, Delascio, Dunsterville, & Dunsterville 103520, determined as "A. cf. laxiflora Benth." by a recent worker, is actually A. floribunda Moritz & Moldenke.

Emended citations: TRINIDAD & TOBAGO: Trinidad: W. E. Broadway 7386 (E—973856, F—689810), s.n. [St. Ann's] (F—516533, R—9137), s.n. [Buenos Ayres] (D—583033, F—492732, R—9463, W—1047687); Finlay s.n. [Trin. Bot. Gard. Herb. 2391] (W—1323314, W—1323315); Johnston 114 (W—1047727). GUYANA: R. Schomburgk 772 (F—686459—isotype, W—702888—isotype).

AEGIPHILA LEHMANNII Moldenke

Additional & emended bibliography: Moldenke in Fedde, Repert. Spec. Nov. 33: 131. 1933; Brittonia 1: 266, 315—316, 474, & 476. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 13: 330. 1966; Moldenke, Fifth Summ. 1: 114 (1971) and 2: 846. 1971.

Additional & emended citations: COLOMBIA: Boyacá: Lawrance 156 (E—1039374, Se—193464, W—1482473).

AEGIPHILA LEWISIANA Moldenke

Additional & emended bibliography: Moldenke, Brittonia 1: 257, 258, 270, 400—402, & 473. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 568. 1941; Moldenke, Phytologia 13: 330. 1966; Moldenke, Résumé Suppl. 14: 2 (1966) and 15: 4. 1967; Moldenke, Fifth Summ. 1: 121 (1971) and 2: 846. 1971.

Steyermark & Rabe describe this species as a "vining shrub, leaves membranous, dull green below", and found it growing at 700—750 meters altitude, fruiting in August.

Additional citations: VENEZUELA: Sucre: Steyermark & Rabe 96143a (Rf).

AEGIPHILA LHOTZKIANA Cham.

Additional & emended synonymy: Aegiphila lhotskiana Cham. ex Steud., Nom. Bot., ed. 2, 1: 29. 1840. Aegiphila lotskyana Cham. ex Walp., Repert. Bot. Syst. 4: 121. 1845. Aegiphila khotskyana Cham. ex Schau. in A. DC., Prodr. 11: 648. 1847. Aegiphila lhotskyana Cham. ex Schau. in Mart., Fl. Bras. 9: 279. 1851. Aegiphila lhotzkiana Cham. ex Bocq., Adansonia, ser. 1, 3: 190. 1863. Aegiphila lhotskiana Cham. ex Jacks. in Hook. f. & Jacks.,

Ind. Kew., pr. 1, 1: 46. 1893. Aegiphila khotzkiana Cham. ex Moldenke, Brittonia 1: 323, syn. in text. 1934; Prelim. Alph. List Invalid Names 2, in syn. 1940. Aegiphila lhotzkyana Cham. ex Moldenke, Brittonia 1: 323, syn. in text. 1934; Rawitscher, Journ. Ecol. 36: 248, 250, & 251. 1948. Aegiphila lhotzkiana Schau. ex Moldenke, Brittonia 1: 323, syn. in text. 1934; Prelim. Alph. List Invalid Names 2, in syn. 1940. Aegiphila lhotzkiana Cham. & Schlecht. ex Moldenke, Brittonia 1: 323, syn. in text. 1934; Prelim. Alph. List Invalid Names 2, in syn. 1940. Aegiphila glandifera Casar. ex Moldenke, Phytologia 1: 232, in syn. 1937. Aegiphila vestita Mart. ex Moldenke, Phytologia 1: 232, in syn. 1937. Vitex erythrocarpa Salzm. ex Moldenke, Phytologia 1: 232, in syn. 1937 [not V. erythrocarpa Gürke, 1928]. Aegiphila glandulifera Casar. ex Moldenke, Suppl. List Invalid Names [1], in syn. 1941 [not A. glandulifera Moldenke, 1932]. Aegiphila chotzkiana Cham., in herb. Aegiphila knotzkiana Cham., in herb.

Additional & emended bibliography: Schau. in Mart., Fl. Bras. 9: 279—280 & [309]--[310]. 1851; Bocq., Adansonia, ser. 1, 3: 190. 1863; Bocq., Rév. Verbenac. 190. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46. 1893; Glaz., Bull. Soc. Bot. France 58 [sér. 4, 11], Mém. 3: 546. 1911; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 46. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 5. 1947; Moldenke, Phytologia 5: 151 (1954) and 5: 484. 1957; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 46. 1960; Angely, Fl. Anal. Paran., ed. 1, 579. 1965; Moldenke, Phytologia 13: 330—331. 1966; Moldenke, Résumé Suppl. 16: 14. 1968; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 1 & 827, map 1368. 1970; Goodland, Phytologia 20: 78. 1970; Moldenke, Fifth Summ. 1: 145, 379, 380, 383, & 384 (1971) and 2: 717 & 846. 1971; Moldenke, Phytologia 23: 427. 1972.

Recent collectors describe this species as a shrub, tree-like shrub, gnarled treelet, or small tree, 1—5 m. tall, the trunk 5—10 cm. in diameter, the leaves and calyx yellow-green, the anthers white, and the ripe fruit reddish-orange. The Eitens describe it as a "thin, erect" shrub, "unbranched until the top", growing in "degraded cerrado" with "young barbatimão trees and shoots 1—3 m. tall, spaced 2—5 m. apart, the ground recently burned". Other collectors have found it growing on creek banks, in cerrado, in chapada woodland ["local name for cerradão"], on the "steep slopes of cerrado", and "occasional on rocky slopes", at altitudes of 350—1200 meters, flowering in October and November, and fruiting in February. The corollas are described as "white" on Irwin, Souza, & Reis dos Santos 9337, 9632, & 9970, "cream" on Hatschbach & Pelanda 27722, and "pale greenish-yellow" on Cuatrecasas 26592.

Mimura describes A. lhotzkiana and its habitat as "Área originariamente de mata entrelaçada com cerrado; agora é campo com algumas árvores baixas e arbustos; Este no. colectado em lugar com arbustos até 2 m alt. espaçadas entre si 3—5 m.....arbusto 2 m alt. Fruto elipsoidal-prolato de 4 x 7 mm, verde-alaranjado."

The Eitens record the vernacular name "canudeiro".

Additional & emended citations: BRAZIL: Bahia: Blanchet 286 (P), 354 (F--686589), 3399 (F--686590); Gaudichaud 2 (P); Glocker 540 (W--1342248); Salzmann s.n. (E--116209). Distrito Federal: Irwin, Souza, & Reis dos Santos 9632 (Ac, N). Goiás: Irwin & Soderstrom 7477 (N); Irwin, Souza, & Reis dos Santos 9337 (N, Rf), 9970 (N, Rf). Minas Gerais: Hatschbach & Pelanda 27722 (Ld); Regnell 1.310x (W--201218); Warming s.n. [Lagoa Santa] (F--667334). Paraná: Dusén 1028a (W--1481940); Jönsson 1028a (E--1036606). São Paulo: Cuatrecasas 26592 (N); Eiten & Eiten 2435 (Ba); Mimura 216 (N), 301 (N); Severén 188 (W--201214). Balsas Island: Eiten & Eiten 10776 (N). State undetermined: Herb. Bernhardt s.n. (E--118058).

AEGIPHILA LONGIFOLIA Turcz., Bull. Soc. Imp. Nat. Mosc. 36: 218--219. 1863 [not A. longifolia Willd., 1941].

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 46 (1893), pr. 2, 1: 46 (1946), and pr. 3, 1: 46. 1960; Moldenke, Phytologia 13: 331. 1966; Moldenke, Fifth Summ. 1: 114 & 145 (1971) and 2: 846. 1971.

The A. longifolia Willd., referred to above, belongs to the synonymy of A. laevis (Aubl.) Gmel.

Emended citations: COLOMBIA: Santander: Schlim 688 (F--686824-isotype).

AEGIPHILA LONGIPETIOLATA Moldenke

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 6. 1938; Fedde & Schust. in Just, Bot. Jahresber. 60 (2): 569. 1941; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 704 & 712. 1960; Moldenke, Phytologia 7: 484--485. 1961; Moldenke, Fifth Summ. 1: 139 (1971) and 2: 846. 1971; Moldenke, Phytologia 25: 296 & 297. 1973.

Macbride (1960) says "Similar to A. chrysantha but glabrate and, ex char., petioles 5--15 mm. long, leaves lanceolate to oblong, acute at base, about 7--12 cm. long, 2.5--4 cm. wide, glabrous, with about 5 pairs of secondary nerves; panicle terminal, ample (to nearly 2 dm. long), the 11--13 cymes well-peduncled; calyx about 2.5 mm. long, with 4 small teeth; corolla-tube about 3.5 mm. long. -- If this glabrous variant of A. chrysantha Hayek, in which Hayek included Weberbauer 4667, is correctly placed the other differences could conceivably also be within an expected range of variations for any species. Some material of A. chrysantha has oblong-lanceolate leaves and of course inflorescences vary in size. The type of both plants were from the same general region, 'Yurimaguas'." He cites only the type collection.

AEGIPHILA LUSCHNATHI Schau.

Additional & emended bibliography: Schau. in Mart., Fl. Bras. 9: 285--286 & [309]--[310]. 1851. [to be continued]

# HERBARIUM NOTES, IV

Lyman B. Smith

BEGONIA BARKLEYANA L. B. Smith, nom. nov. Begonia dusenii Brade, Bol. Mus. Nac. Rio de Janeiro, II. Bot. no. 1: 15, pl. 6. 1944; L. B. & R. C. Smith, Fl. Ilust. Catharinense I. fasc. BEGO: 54, pl. 15. 1971, non Warburg, 1895.

This new name is in honor of Professor Fred A. Barkley, whose analytical list, "The Species of Begoniaceae," is the first great step toward a new classification of both wild and cultivated species.

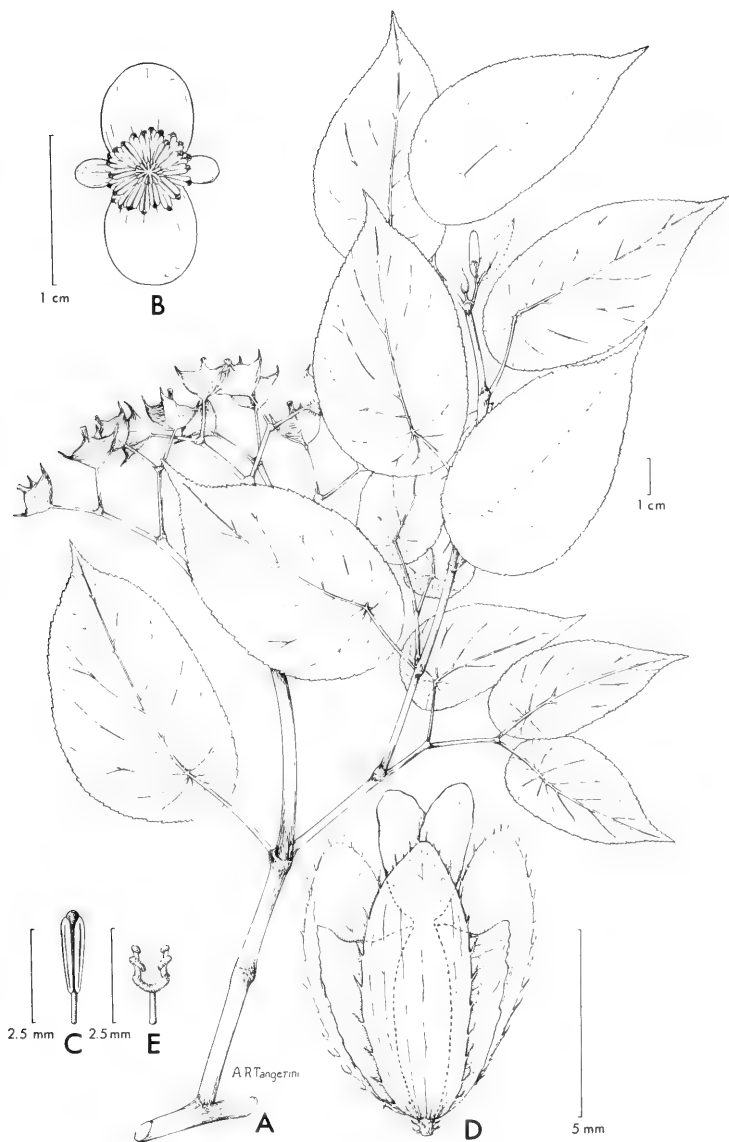
BEGONIA CONVULVULACEA (Kl.) A. DC. in Mart. Fl. Bras. 4, pt. 1: 367. 1861; Barkley, Species Begoniaceae in Buxtonian, 1, suppl. 5: 19. 1972. Begonia geniculata Vell. Fl. Flum. Icon, 10: pl. 51. 1831; Fl. Flum. ed. 2 in Arch. Mus. Nac. Rio de Janeiro 5: 407. 1881; L. B. & R. C. Smith, Fl. Ilust. Catarinense I. fasc. BEGO: 11, pl. 2. 1971, non Jack, 1822.

BEGONIA TRUJILLENSIS L. B. Smith, sp. nov. B. exalata C. DC. (sect. Apteron) in systemate Irmscheri (Pflanzenfamilien ed. 2. 21: 580. 1925) affinis sed foliorum laminis peltatis, tepalis femineis 2 differt.

Sprawling herb or suffrutex 1-1.5 m high; stems flexuous, swollen at the nodes glabrous. Leaves peltate 4-15 mm above base, slightly asymmetric, elliptic, acute or acuminate, broadly rounded at base, to 8 cm long and 4 cm wide, penninerved, serrulate, finely ciliate, sparsely hirsute above and on the nerves beneath; petioles to 3 cm long; stipules deciduous, elliptic-oblong, entire, pale brown, glabrous. Peduncles becoming axillary, 30-45 mm long. Inflorescences unisexual, cymose, many-flowered, ca. 10 cm broad, glabrous. Bracts deciduous, unknown but probably similar to the bracteoles. Pedicels 4-10 mm long. Staminate tepals 4, white with some rose at base, the outer orbicular, 6 mm wide, the inner narrowly obovate, 4 mm long. Stamens numerous, free or nearly so; filaments less than 1 mm long; anthers oblong to narrowly obovate, 2 mm long, the connective produced, obtuse. Pistillate bracteoles elliptic, exceeding the ovary, membranaceous, ciliate. Pistillate tepals 2, elliptic. Styles regularly bifid; stigmas linear, spiral, continuous; placenta bilamellate, ovuliferous throughout. Capsule turbinate, equally 3-horned as in section Casparya, the horns slender, attenuate.

VENEZUELA: TRUJILLO: cloud forest by stream, 32 km from Trujillo on the old road to Boconó between Urbina and San Rafael, 2300-2500m, 3-4 September 1966, Steyermark & Rabe 97227 (VEN, holotype; US, isotype). Misisi, 28 August 1941, Tamayo 1824 (VEN)

Begonia trujillensis looks much more like species of the section Casparya than it does like B. exalata, but its regularly 2-parted styles exclude it from Casparya.



*BEGONIA TRUJILLENSIS*

A, fruiting branch. B, staminate flower. C, stamen.  
D, pistillate flower. E, style.

## BOOK REVIEWS

Alma L. Moldenke

"THE BIOLOGY AND UTILIZATION OF GRASSES" edited by V. B. Youngner & C. M. McKell, xx & 426 pp., illus., Academic Press, London NW1 7DD & New York, N. Y. 10003. 1972. \$22.50.

This volume of "Physiological Ecology: A Series of Monographs, Texts and Treatises" covers the symposium on Grass Biology held at Riverside, California, in 1969 and therefore becomes an excellent text and reference source for courses in grass biology, forages, turfgrass and range management, ecology and general agronomy and for the professionals in these fields looking for modern scientific advances.

The book opens with an excellent article by G. Ledyard Stebbins on the evolution of the grass family stressing the effects of polyploidy and apomixis. It is followed by four chapters on practical grass breeding problems. Then there are six chapters on vegetative growth, then there are five ecologically oriented chapters, then four chapters on soils and mineral nutrition, and finally there are eight chapters on defoliation, carbohydrate reserve, flowering, seed production and future needs in grass research for range, forage and turfgrass.

The material is indexed more thoroughly for authors than for content. A handful of spelling errors slipped through, as, for instance, mowing on p. xix, entirely on p. 5, and obviously on p. 18.

"NUCLEIC ACIDS AND PROTEINS IN HIGHER PLANTS" edited by G. L. Farkas, 372 pp., illus., Akademiai Kiado, Publishing House of the Hungarian Academy of Sciences, Budapest. 1972. \$15.00.

Here are the proceedings of the [first international] symposium held at the Biological Research Institute in Tihany in September 1971. Section I has nine papers on plant nucleic acids, as short-time labelled RNAs of soybean and carrot; Section II has 8 papers on protein synthesis, as the role of ATP sulphurase in the biosynthesis of cysteine; Section III has eleven papers on nucleic acid and protein synthesis in cell particles, as ribosomes in pea seeds; Section IV has six papers on hormonal control of nucleic acid and protein synthesis, as environmental and chemical control of RNA breakdown in leaves; and Section V contains 4 papers on nucleic acids and proteins in plant development, as changes in isozymes of host and pathogen following some fungal infections.

Much valuable and new material, well documented, is now available in this book for biochemists, cytologists and agronomists

(since many of the plants mentioned are of economic importance) and their students. It is therefore a pity that a detailed index was not also prepared and included.

"A HANDBOOK OF THE TREES OF NEW ENGLAND — with Ranges throughout the United States and Canada" by Lorin L. Dame & Henry Brooks, xx & 196 pp., illus., Facsimile Edition, Dover Publications, Inc., New York, N. Y. 10014. 1972. \$3.00 paper-back.

This is a republication of the now most limitedly available 1901 work from which an obsolete list of botanical authorities has been omitted and to which a modern list of nomenclatural changes has been added by E. S. Harrar.

The amateur naturalist and students of field biology and ecology will find this new edition very helpful because of the clearcut descriptions and eighty-seven excellent full-page line drawings. Notes on horticultural value are also included.

"HERBS AND SAVORY SEEDS — Culinaries, Simples, Sachets, Decoratives" by Rosetta E. Clarkson, xiv & 370 pp., illus., Facsimile edition, Dover Publications, Inc., New York, N. Y. 10014. 1972. \$3.00 paper-back.

This is an unabridged replicate of the 1939 "Magic Gardens: A Modern Chronicle of Herbs and Savory Seeds" to which a foreword has been added by Gertrude B. Foster who dedicates this edition to the memory of the author, her friend and mentor.

Herb gardening and history buffs, as well as the general reader, will enjoy this charming, inexpensive and now easily available book which presents much of fact and lore about the growth and the uses of these plants. The lovely old illustrations are well reproduced.

"THE CHEMISTRY OF PLANT PIGMENTS" edited by C. O. Chichester, xiv & 218 pp., illus., Academic Press, London NW1 7DD & New York, N. Y. 10003. 1972. \$13.00.

This book is listed as Supplement 3 to the "Advances in Food Research" series. From a chemical and biochemical viewpoint it attempts to bring together in a single format the three major classes of pigments: chlorophylls, carotenoids, and flavenoids, in order to illustrate the recent progress and indicate the needs for further research. The sixteen authors are directly or indirectly students of Dr. Gordon Mackinney, to whom this work is dedicated.

The papers cover (1) citrus carotenoids from Citrus relatives and their hybrids analyzed for their mass spectral properties, (2) biosynthesis of carotenoids in yeasts like Rhodotorula,

Cryptococcus and Sporobolomyces, (3) naturally occurring nonapreno and decapreno carotenoids in certain gram-positive aerobic bacteria, (4) excited states of some plant pigments as the phosphorescent triplet states of chlorophylls, (5) reaction center chlorophylls of photosynthetic bacteria, algae and spermatophytes, (6) biosynthetic pathways in the different chlorophylls, (7) chlorophyll function in photosynthesis, (8) new chemistry in anthocyanin-type plant pigments, especially in commercial plant production, (9) factors controlling coloration and discoloration of other plant phenols which often affect anthocyanin color by copigmentation and copolymerization, and (10) absorption spectra and anthocyanins in vivo affected by pH, metals and copigmentation.

Much valuable new material and bibliography are presented in this work, which should appeal to many different kinds of scientists and students.

On p. 121 oligomer is misspelled.

"HUMAN POISONING FROM NATIVE AND CULTIVATED PLANTS" by James W. Hardin & Jay M. Arena, M.D., ix & 167 pp., illus., Duke University Press, Durham, North Carolina 27708. 1969. \$6.00.

"We do not wish to recommend the elimination or eradication of native and exotic plants which are dangerous, and by no means do we want to make people afraid to venture out-of-doors. All dangers cannot be removed from our surroundings, but we can learn to recognize and avoid them.....We hope that an awareness of these potential dangers, with appropriate education of children [no sucking or eating of unknown plants, etc.], can measurably decrease the number of cases of plant poisoning that occur each year". So write this well matched team of authors, one a botanist with much field experience and the other a professor of pediatrics with a special interest in this field.

The culprit plants from the United States, including Alaska and Hawaii, and from Canada are arranged according to their botanical families, given their scientific and common names, described easily and effectively, located, given the nature and cause and symptoms of their poisoning, and for the physician are given treatment directions. Over 300 plants are considered with many well illustrated by line drawings or photographs. All of these plants are known to cause allergies, dermatitis, or internal poisoning in human beings.

There are tables of over 200 "berry" producing plants with notes on their edibility, etc., an illustrated glossary [with acuminate misspelled!], and a good general bibliography arranged by states.

This is a handy book to have around!

"ILLUSTRATED GENERA OF IMPERFECT FUNGI", 3rd edition by H. J. Barnett & Barry B. Hunter, v & 241 pp., illus., Burgess Pub-

lishing Co., Minneapolis, Minnesota 55415. 1972. \$6.00 spiral bound paper-back.

For the students of mycology and phytopathology and for any others interested in the imperfect fungi this updated "collection of illustrations brought together under the same cover with brief descriptions and [completely revised] keys to genera" should prove helpful in identification work.

Authorities are given routinely for the genus but never for the species. There is a short glossary helpful to the beginners in this field. Over a hundred new references have been added to the bibliography. The line drawings are clear cut. An additional key for the Moniliales has been added according to the newer Hughes-Tubaki-Barron system "based primarily on the mode of development of the conidia on the conidiophore. Shape, pigmentation and septation of conidia are reduced to secondary characteristics".

"RANGE DEVELOPMENT AND IMPROVEMENTS" by John F. Vallentine, xii & 516 pp., illus., Brigham Young University Press, Provo, Utah 84601. 1971. \$10.95.

This text and reference manual for ranchers, range technicians, public land administrators, agribusiness personnel, educators and students should prove really valuable since it stresses not only practical work but also the basic principles involved and therefore is usable far beyond the local plains, prairies and intermontane region of its origin.

In order to reach its goal of "sustained maximum animal production consistent with perpetuation of the natural resources" the author discusses mainly (1) control of noxious plant invasions manually, biologically, mechanically and herbicidally, (2) range improvement by burning, by seeding, by fertilizing, and by special treatments like interseeding, furrowing, waterspreading, and insect and rodent control, and (3) range animal handling practices and facilities.

The book is copiously and effectively illustrated. It is also provided with useful appendices on the scientific names of plants mentioned, practical budgeting, herbicides, and forage plants.

"THE GOLDEN AGE OF HERBS AND HERBALISTS" by Rosetta E. Clarkson, xxii & 328 pp., illus., Facsimile Dover Publications, Inc., New York, N. Y. 10014. 1972. \$3.00 paper-back.

This is an unaltered replication of the 1940 edition originally entitled "Green Enchantment: The Magic Spell of Gardens". To it has been added a foreword by Gertrude E. Foster who, with her husband, knew the author and her husband well, sharing interests in herbs and garden history.

This charmingly and authentically written book covers such topics as a monastery garden, the golden age of herbalists, the witches' garden, and early gardening tools. Now this material is easily available again at a very inexpensive price.

"PLANT GROWTH SUBSTANCES IN AGRICULTURE" by Robert J. Weaver, xviii & 594 pp., illus., W. H. Freeman & Co., San Francisco, California 94104. 1972. \$19.50.

"This book is written largely from an agricultural point of view [but also effectively stressing the biological principles and processes involved] and stresses both present and possible future important commercial uses of growth substances in agriculture." It is designed principally for classroom and laboratory instruction for a semester college course. "An extensive documentation of the literature has been included to provide the reader with sufficient references for an in-depth study of any subject and particular interest".

For auxins, gibberellins, cytokinins, inhibitors and ethylene — where pertinent — nomenclature, history, biological and chemical determination, occurrence and chemical nature, biological effects and mechanism of action, rooting and propagation, dormancy, flowering, fruit set and development, senescence, abscission, size control and related phenomena, and weed control are carefully elaborated.

"SEED BIOLOGY" Volume I Importance, Development, and Germination" edited by T. T. Kozlowski, xiii & 416 pp., illus., Academic Press, London NW1 7DD & New York, N. Y. 10003. 1972. \$24.

This is the first in a three-volume series planned to cover all phases of seed biology. It starts out very effectively with these chapters: (1) importance [food for man and animals, fibers, spices, beverages, edible and industrial oils, vitamins, drugs, weed and poison damage] and characteristics of seeds; (2) development of gymnosperm seeds; (3) development of angiosperm seeds; (4) anatomical mechanisms for seed dispersal [excellent treatment for teachers of biology and botany]; (5) seed germination and morphogenesis; and (6) seed and seedling vigor.

The book is well organized and effectively illustrated, provided with author and subject indexes, worthwhile but expensive. The addition of an index to the many scientific plant names mentioned would have made the content available to even more scientific workers, especially those approaching information from a systematic orientation. There is well documented material here for a wide range of workers and students.

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# PHYTOLOGIA

*Designed to expedite botanical publication*

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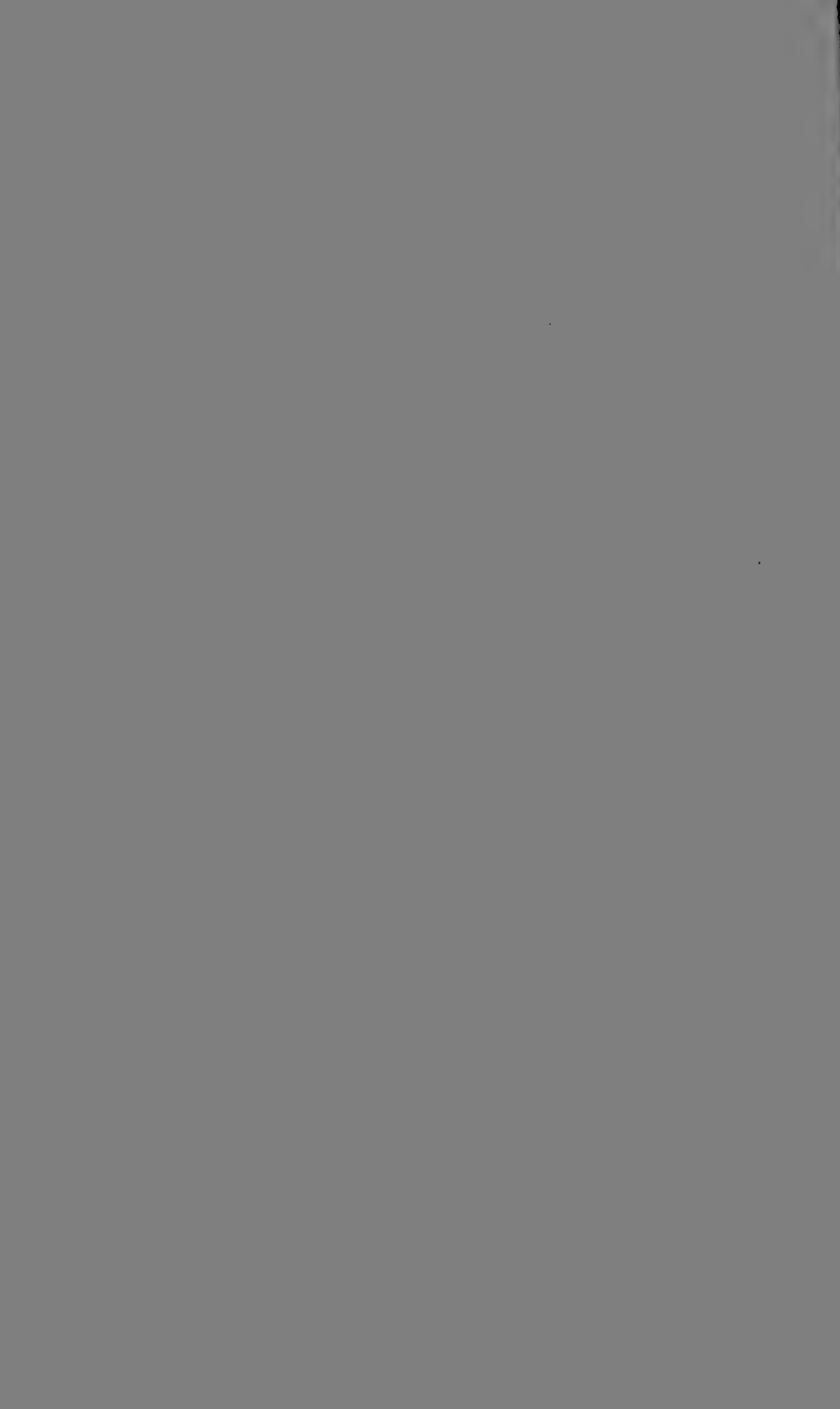
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DACTYLOSTIGMA, A NEW GENUS OF CONVULVULACEAE FROM MADAGASCAR

Daniel F. Austin<sup>1</sup>

Styles and stigma structures have classically been important for generic delimitation of the Convolvulaceae. While these characters may have been overemphasized in some species, they are valuable criteria (Linnaeus, 1763; Endlicher, 1838; Vatke, 1876; Radlkofer, 1883; Afzelius, 1929; van Ooststroom, 1964). Recently several authors have demonstrated correlations between stigma and style morphology and other organs, thus providing new support for use of these gynoecial characters in generic classification (Lewis & Oliver, 1965; Austin, 1970; Robertson, 1971).

The stigmas of a collection from Madagascar by Humbert & Swingle (5368) are unique to the family (Fig. 1); they approach those found in the Australian genus Polymeria, but are not exactly like them (Fig. 2). The general aspect of the Madagascar specimen suggests affinity with the genus Calycobolus (House, 1907; Heine, 1963; Austin, 1971); enlarged bracteose sepals are common to them as is the liana habit. Stigma structure is, however, markedly different in Calycobolus and the Madagascar specimen (Fig. 1,3). Detailed examinations of the convolvulaceous genera in the Field Museum (Chicago), the Missouri Botanical Garden (St. Louis), and the Smithsonian Institution (Washington) and a thorough perusal of the literature (Austin, 1970, 1971, 1973) revealed no other plants in the family which could be considered congeneric with the Humbert & Swingle collection. Dr. B. Verdcourt (pers. comm.) has not (1970) examined material in England which conforms to the Humbert & Swingle collection.

The tribe Poraneae may well contain additional genera when examined in more detail. Verdcourt (pers. comm.) has been studying some of the species in the tribe and has found considerable diversity and generic confusion. The entire tribe needs detailed study.

While it is usually not advisable to describe new taxa from single collections, I feel that the divergence of the Madagascar collection from other Convolvulaceae justifies such description.

---

<sup>1</sup>Department of Biological Sciences, Florida Atlantic University, Boca Raton, Florida 33432

DACTYLOSTIGMA D. Austin, gen. nov.; affine tribus Poraneae parietibus chartaceis fructus indehiscentis. Ab generibus aliis corollis campanulatis, multis lobis stigmatorum, ovariis unilocularibus, foliis linearibus sessilibus differt. Typus generis:

Dactylostigma linearifolia D. Austin, sp. nov.; species Calycoboli simile, differt multis lobis stigmatorum foliisque linearibus. Fig. 1.

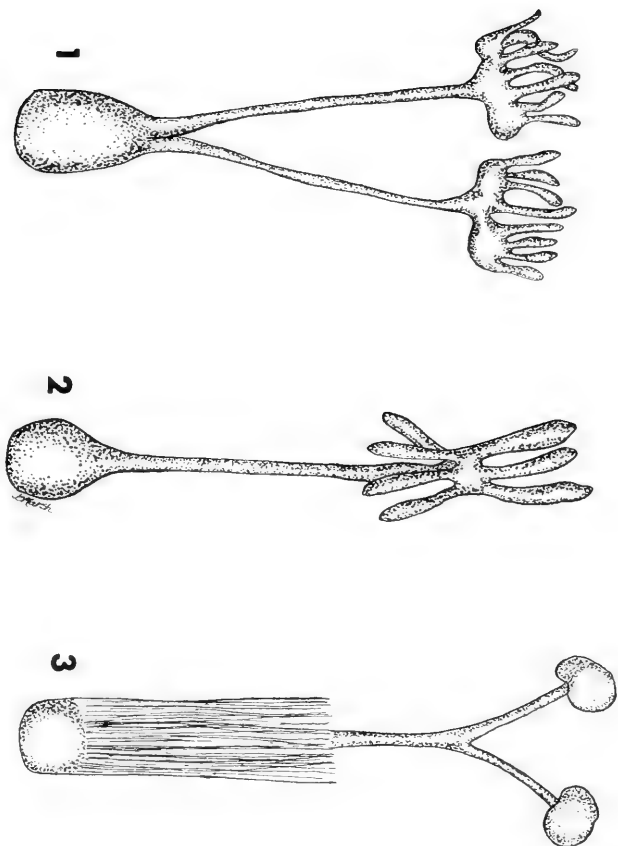
Frutex scandens circiter 2 m altus, ramis glabris, cinereis; foliis sessilibus, linearibus, 2-2.5 cm longis, 1.7 mm latis, pubescentia trichomatum parvorum dispersorum; inflorescenti subracemosa vel ex floribus solitariis in axillis foliorum constanti; floribus subsessilibus; sepalis duobus extimis 13-14 mm longis, 11-12 mm latis, sepalo tertio parviore, 10 mm longo, 5 mm lato, subfalcato, sepalis duobus intimis inaequalibus, oblongis vel oblongo-falcatis, 7-8 mm longis, 2 mm latis, sepalis ubique trichomata adpressa tectis, nervaturis sepalorum prominentibus; corolla campanulatis, 7 mm longis, ad medium usque lobatis; staminibus usque ad sinus attingentibus; filamentis subulatis, 2 mm longis, glabris, 1 mm supra basin corollae affixis; antheris deltoideis, 0.5 mm longis; ovario immaturo non visa; stylis 2, imo libris, 2.5 mm longis; stigmatibus in aliquot ramos lineares divisis; ramis usque ad 1 mm longis; fructibus ut videtur unilocularibus, ovulis 4, uno maturescenti, 3 abortivis; parietibus fructus chartaceis; parietibus seminis non-lignescentibus tenuibus; endospermio sparse; embryo longiplicato; radícula 3 mm longa; cotyledonibus foliaceis, 3-4 mm longis, 3 mm latis. Typus speciei.

Type: Madagascar, delta de la Linta (cote sud-ouest), arbuste sarmenteus 2 m, alt. 1-10 m, 24-28 Aug 1928, Humbert & Swingle 5368 (Holotype MO).

In order to properly orient this genus in the tribe Poraneae, the following artificial key is provided. The key should not be interpreted as revisionary and is not intended to suggest relationships of any kind; it is solely for the purpose of identification. Herbarium material as well as published descriptions of all genera except Rapona have been used to construct the key. I have been unable to obtain or examine material of the endemic Madagascar genus Rapona (but see Verdcourt, 1972).

#### ARTIFICIAL KEY TO GENERA IN THE TRIBE PORANEAE

- a. Sepals of flower subequal in length, accrescent in fruit, equal or unequal in fruit. Leaves mostly rounded to cordate at the base.
  - b. Calyx gamosepalous, anthers ellipsoid, lower parts of the disc swollen . . . . . Rapona Baillon



FIGURES 1-3. Some gynocia in the Convolvulaceae.

Fig. 1. Dactylostigma (from Humbert & Swingle 5368 MO).

Fig. 2. Polymeria (redrawn from Endlicher, 1838).

Fig. 3. Calycobolus lanulosus D. Austin (from Belem & Mendes 215 US). Semidiagrammatic; not drawn to scale.

- bb. Calyx lobes free, anthers linear to oblong, disc more or less evolute. . . . . Porana Burmann
- aa. Sepals of flower markedly different in size, accrescent in fruit, the outer two or three sepals large and bracteoid in fruit. Leaves mostly rounded, cuneate or acute at the base.
- c. Stigma one per styler branch, globose, subglobose or ellipsoid, corolla funnelform, tubular or urceolate, leaves elliptic to ovate or cordate, petiolate.
- d. Stamens equal in length, pollen 3-colpate, plants of the New World . . . . . Calycobolus Willd. (in part)
- dd. Stamens unequal in length, pollen pantocolpate or pantoporate, plants of the Old World.
- e. Style one, ovary subtended by a "gynophore", plants of Madagascar . . Cardiochlamys Oliver
- ee. Style with two branches, ovary without a "gynophore", plants of Africa.
- f. Apex of fruiting sepals emarginate, stigmas ellipsoid, corolla funnelform, plants of the Cameroon . . . . . Dipteropeltis Hallier f.
- ff. Apex of fruiting sepals acute to acuminate, stigmas globose, corolla funnelform, tubular or urceolate, plants widely spread in Africa . . . . . Calycobolus (in part)
- cc. Stigmas of several linear lobes per style, corolla campanulate, leaves linear . . . . . Dactylostigma D. Austin

#### Acknowledgements

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NOTES ON NEW AND NOTEWORTHY PLANTS. LVIII

Harold N. Moldenke

*AEGIPHILA MOLLIS* var. *SURFACEANA* (Moldenke) Moldenke, stat. nov.

*Aegiphila surfaceana* Moldenke, *ull. Torrey Bot. Club* 58: 462--463. 1931.

*ERIOCAULON REITZII* Moldenke & Smith, sp. nov.

Herba crassa, brevissime caulescens. Radices simplices, crassae, spongiosae, albae. Folia erecto-fasciculata, 11--14 cm. longa, basi dilatata; laminis suboblongis, apice attenuatis, medio 8--10 mm. latis, planis subcoriaceis, opacis, glabris. Pedunculi 2 vel 3, ad 35 cm. alti, apice 1 mm. diametro, paulo torti, 8-costati, glabri; vaginis laxis, folia paulo superantibus, apice acute bilobatis. Capitula per anthesin globosa 8 mm. diametro dense persistenterque albo-villosa. Bracteeae involucri reflexae late ovatae acutae ad 3 mm. longae flavae glabrae; bracteis florigeris sublanceolatis acutis basi longe attenuatis, flores subaequantibus, apice dense albo-villosis. Flores subsessiles; masculinorum sepalis 3 cuneato-spathulatis apice late rotundatis et dense albo-villosis, posterioribus alto-connatis sed facile fissis; petalorum lobis subaequalibus spathulatis intus dense albo-villosis et maculam unicam nigram ornatis; antheris nigris florum femineorum sepalis petalisque eis masculinis similibus.

The type of this species was collected by Raulino Reitz and Roberto M. Klein (no. 5428) at Rancho Queimado in the Serra da Boa Vista, Santa Catarina, Brazil, at an altitude of 1200 meters, on October 24, 1957, and is deposited in the United States National Herbarium, Smithsonian Institution, Washington, D. C.

*PAEPALANTHUS CATHARINAE* var. *HATSCHBACHI* (Moldenke) Moldenke & Smith, stat. nov.

*Paepalanthus hatschbachi* Moldenke, *Lloydia* 13: 224--225. 1950.

*PAEPALANTHUS HILAIREI* var. *POHLIANUS* Moldenke, *Phytologia* 25: 229 & 241, hyponym. February 6, 1973; nom. nov.

*Paepalanthus hilairei* var. Körn. in *Mart., Fl. Bras.* 3 (1): 332. 1863.

*PAEPALANTHUS LANGSDORFFII* var. *CARACENSIS* Moldenke, var. nov.

Haec varietas a forma typica speciei bracteis involucrantibus perspicue subrotundis recedit.

This variety differs from the typical form of the species in its conspicuously broadly rotund involucral bractlets.

The type of the variety was collected by H. S. Irwin, R. M. Harley, and E. Onishi (no. 29110) in wet places in a steep valley on the sandstone summit of Serra da Caraça, with soil-filled cracks and depressions, adjacent precipices, and steep valleys,

at 1750—1950 meters altitude, in the Serra do Espinhaço, on the Planalto do Brasil, Minas Gerais, Brazil, on January 25, 1971, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as having inflorescences to about 50 cm. tall, with the individual flower-heads white.

*PAEPALANTHUS LEISERINGII* var. *KLEINII* Moldenke & Smith, var. nov.

Haec varietas a forma typica speciei recedit foliis 3.5—5.5 cm. longis utrinque glabris (in juventute marginibus longiter ciliatis) 3—7 mm. latis, pedunculis 5—9 folias duplo longioribus 5.5—10 cm. longis profunde sulcatis glabris, vaginis glabris, et bracteolis involucrentibus stramineis lanceolatis.

This variety differs from the typical form of the species in having its leaves shorter than the peduncles during anthesis, merely 3.5—5.5 cm. long, merely 3—7 mm. wide, glabrous on both surfaces except for the long-ciliate margins when young, peduncles only 5—9 per plant, 5.5—10 cm. long, to twice as long as the leaves during anthesis, deeply and conspicuously sulcate and costate, glabrous, the sheaths glabrous, and the involucre bractlets stramineous, lanceolate.

The type of this variety was collected by Lyman B. Smith and Roberto M. Klein (no. 8241) in a bog by the Rio Bandeirinhas, 23 km. north of Lajes, at an altitude of 800—900 meters, Santa Catarina, Brazil, on December 4, 1956, and is deposited as sheet number 2267638 in the United States National Herbarium, Smithsonian Institution, Washington, D. C. The typical form of the species has its leaves pubescent, 16—19 cm. long, 8—9 mm. wide, conspicuously surpassing the scapes, peduncles 20—30 per plant, subequaling or shorter than the leaves, very obscurely costate, 16—17 cm. long, the sheaths pubescent, and the involucre bractlets conspicuously black and triangular-ovate.

*PAEPALANTHUS POLYANTHUS* f. *VILLOSUS* (Beauverd) Moldenke & Smith, stat. nov.

*Paepalanthus polyanthus* var. *villosus* Beauverd, Bull. Herb. Boiss., sér. 2, 8: 294—295. 1908.

*SYNGONANTHUS CHRYSANTHUS* var. *CASTRENSIS* Moldenke & Smith, var. nov.

Haec varietas a forma typica speciei pedunculis tricostatis recedit.

This variety differs from the typical form of the species in having only 3-costate peduncles.

The type of the variety was collected by J. Vidal (no. III-74; Vidal & Silva Araujo s.n.) at Castro, in municipality Castro, Paraná, Brazil, in November, 1950, and is deposited as specimen number 77012 in the herbarium of the Museu Nacional at Rio de Janeiro.

*VERBENA PEDICELLATA* Moldenke, sp. nov.

Herba parva, caulibus erectis acute tetragonis minute puberu-

lis perspicue striatis, foliis parvis ellipticis ad apicem basinque acutis utrinque minute puberulis margine denticulatis, inflorescentiis parvis axillaribusque paucifloris spicatis, et floribus breviter pedicellatis.

An herb, apparently rising from an underground woody xylopodium, about 30 cm. tall; stems rather slender, erect, conspicuously and sharply tetragonal, conspicuously longitudinally striate-ridged, very minutely puberulous with sparse usually slightly recurved hairs; leaves decussate-opposite, small, the blades thin-chartaceous, elliptic, 2—3 cm. long, 7—10 mm. wide, acute at both ends, short-petiolate (the petiole very slender and 2—3 mm. long), microscopically puberulent on both surfaces with obscure scattered hairs or glabrescent, the hairs most conspicuous on the denticulate margins, the teeth appressed, antrorse, mostly above the middle of the leaf; inflorescence axillary, spicate, 8—9 cm. long, few-flowered, the flowers on alternate sides of the rachis, hardly contiguous, appressed, erect, plainly pedicellate, the pedicels very slender, about 2 mm. long, densely pilosulous; calyx tubular, about 5 mm. long and 2 mm. wide, 5-ribbed, the rim 5-apiculate, the ribs rather densely puberulent-pilosulous; corolla hypocrateriform, lilac, its tube somewhat exserted from the calyx, the limb 3.5—4 mm. wide.

The type of this species was collected by Gert Hatschbach (no. 30513) on "campo limpo" at Cidade Anhandui, in municipality Campo Grande, Mato Grosso, Brazil, on October 17, 1972, and is deposited in my personal herbarium at Plainfield, New Jersey.

VITEX NEGUNDO var. TRIFOLIOLATA Moldenke, var. nov.

Haec varietas a forma typica speciei foliolis 3 recedit.

This variety differs from the typical form of the species in having its leaves apparently uniformly trifoliolate.

The type of the variety was collected by my good friend and colleague, Dr. Karl Heinz Rechinger (no. 29984), in the Sulaiman Mountains, 100 km. east of Fort Sandeman, between Mughal Kot and Daraban, at an altitude of 700—900 meters, Dera Ismail Khan, West Pakistan, on May 21, 1965, and is deposited in the United States National Herbarium, Smithsonian Institution, Washington, D. C.

ERIOCAULON MODESTUM f. VIVIPARUM Herzog in Luetzelburg, Estud.

Bot. Nordéste 3: 147, 149, & 150 [as "vivipara"], hyponym. 1923; f. nov.

Haec forma a forma typica speciei capitulis plerumque viviparis recedit.

This form differs from the typical form of the species in its flowering-heads at maturity usually being more or less viviparous.

The type of the form was collected by Freiherr Philipp von Luetzelburg (no. 15510) in "brejo" on the Rio Preto, probably in Bahia [perhaps Goiás, as stated on the label], Brazil, and is deposited in the Botanische Staatssammlung at Munich.

A RUELLIA (ACANTHACEAE) SPECIES IN EXOAGONIUM (CONVOLVULACEAE)

Dieter C. Wasshausen<sup>1</sup> and Daniel F. Austin<sup>2</sup>

Reevaluation of the generic status of Exogonium has shown that the taxon presently includes several species better placed elsewhere (Austin, unpublished). The most discordant element in the group is Exogonium velutifolium House. While the second author was studying the specimens at the Smithsonian Institution in 1971 it became obvious that this species was not a member of the Convolvulaceae. We conferred and decided that the species was a previously unnamed Ruellia. To avoid a cumbersome citation by publishing the new combination in Austin's study of Exogonium we decided to publish it separately.

RUELLIA VELUTIFOLIA (House) Wasshausen & Austin, comb. nov.

Basionym: Exogonium velutifolium House, Bull. Torrey Bot. Club 35: 100. 1908.

Type. Mexico, Oaxaca, west side of the valley of Cuicatlan, 2000-4000 ft. alt., Nov. 9, 1894, Nelson 1887 (holotype GH, isotype US).

Suffrutescent herb; stems simple or branched, to 40 cm. high or more, erect or ascending, obscurely quadrangular, velvety-pubescent above, glabrous below; leaf blades oblong-ovate, 6-30 mm. long, obtuse, rounded at the base, entire or irregularly crenate-lobed toward the base, both surfaces densely velutinous; petioles 2-5 mm. long, velutinous; flowers borne axillary or terminal, 2 or 3 together, sessile or nearly so near the ends of the branches; bracts 2, linear-lanceolate, 5-7 mm long, densely velutinous without; calyx 8-9 mm long, the segments subequal, lanceolate, acuminate, tomentose, especially toward the tip; corolla tubular, 3 cm. long or less, crimson, glabrous to puberulous, the narrow portion of the tube 8-10 mm. long, 3 mm. broad at base, narrowed to 1.5 mm., thence gradually enlarged to 8 mm. at the mouth, slightly ventricose, the slightly spreading limb with 5 rounded lobes, these obovate, 5-6 mm. long and wide; stamens subequal, barely reaching the tip of the corolla lobe; staminode subulate, 1.5 mm. long, glabrous; anthers curved, 2 mm. long and 1 mm broad; pollen

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grains spheroid or prolate, about  $50\ \mu$  in diameter; ovary cylindric, 3.5 mm. long, glabrous; style 26 mm. long, glabrous, truncate; capsule not seen.

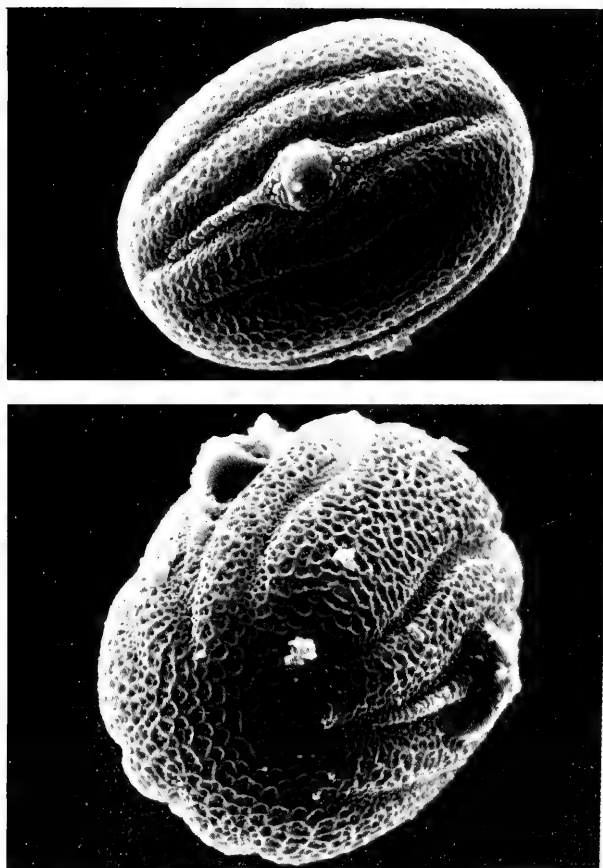
This species is closely related to R. fruticosa (R. cupheoides Fernald), from which it may be distinguished by its smaller leaf blades (6-30 mm. long), sessile or nearly so flowers, and the crimson corolla; those of R. fruticosa have larger leaf blades (30-50 mm. long), the flowers borne on slender peduncles 2-6 cm. long, and the corolla yellow or reddish, with greenish lobes. The species is known only from the type locality.

The pollen of R. velutifolia is unique, it is not of the "Wabenpollen" type usually found in Ruellia but rather of the "Spangpollen" type, figured by Lindau (Beiträge zur Systematik der Acanthaceen. Bot. Jahrb. 18: 36-64. 1893). The pollen grains here are spheroid or prolate, about  $50\ \mu$  in diameter, with three germ pores each in a longitudinal furrow (mesocolpium) reaching almost to the pole, the grains thus being primarily three-furrowed (tricolpate). In addition, there are two shorter subsidiary longitudinal furrows (pseudocolpus) on each side of the main furrow, these nine furrows all converge but do not join at the poles.

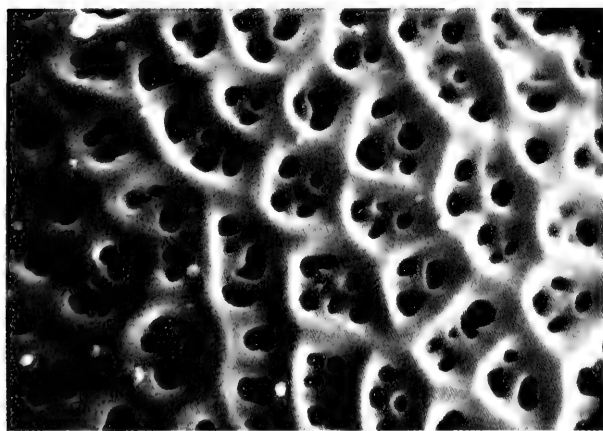
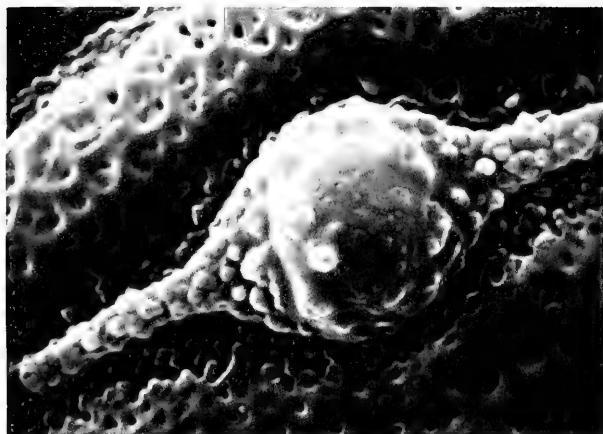
The accompanying photographs were made with the scanning electron microscope (Cambridge Stereoscan Mark 2A), at magnifications between X 1500 and X 5400.

#### ACKNOWLEDGEMENTS

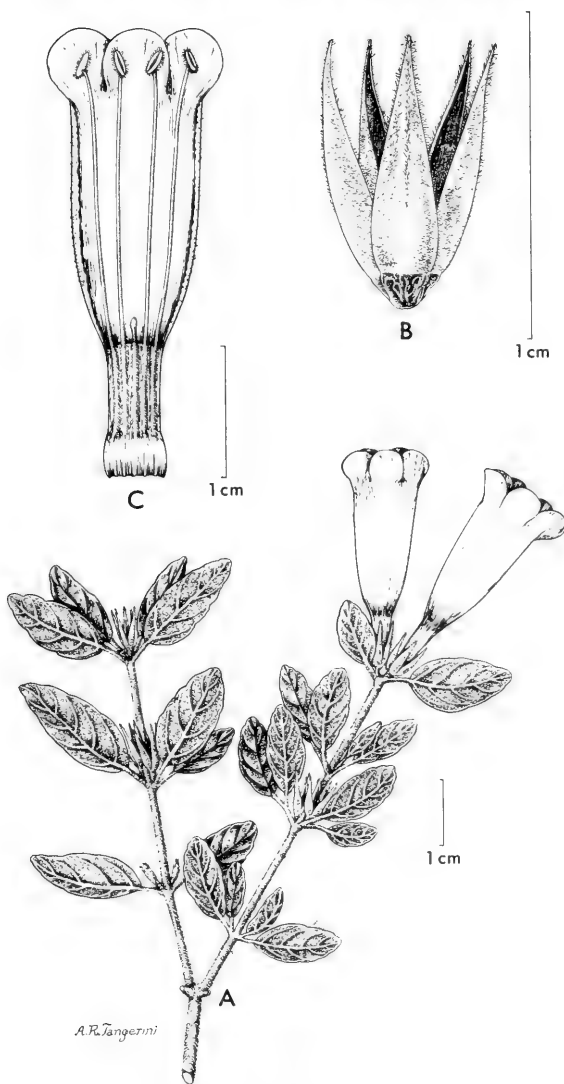
This study was supported by a grant to the second author from the Division of Sponsored Research of Florida Atlantic University and a grant from the National Science Foundation (Smithsonian Institution's 1971 Summer Institute in Systematics -- Species Diversity).



Pollen grain of Ruellia velutifolia (House) Wasshausen & Austin (Nelson 1887); above, equatorial view, X 1500; below, polar view, X 2000.



Pollen grain of Ruellia velutifolia (House) Wasshausen & Austin (Nelson 1887); above germ pore, X 5400; below, surface view, X 5000.



Ruellia velutifolia (House) Wasshausen & Austin: A, Habit, X 1. B, calyx, X 5. C, flower in horizontal section, X 2.

## NEW COMBINATIONS IN ASCLEPIADACEAE

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The following new combinations result from a study of the family Asclepiadaceae for the Flora of Panama and are necessitated by the use of Woodson's realignment of the North American genera of the family (see: Woodson, 1941. Ann. Mo. Bot. Gard. 28: 193-244.).

Cynanchum recurvum (Rusby) Spellman, comb. nov.

Tassadia recurva Rusby, New Sp. South Am. Plants, 97. 1920. COLOMBIA: Magdalena: 1500-3500 ft. Las Partidas, 3500 ft., March 15 and Minea, 2000 ft., June 1921. H. H. Smith 1621 (NY, holotype; MO, isotype).

Cynanchum apocynellum (Gl. & Mold.) Spellman, comb. nov.

Tassadia apocynella Gleason & Moldenke in Moldenke, Phytologia 1: 15. 1933. COLUMBIA: Boyaca: El Umbo region, 130 mi. north of Bogota. Forest fringes at brookside, 3500 ft., 13 Nov. 1932. A. E. Lawrance 584. (NY, holotype; MO, isotype). Examination of two recent collections from Panama at MO raises some question as to the distinctiveness of the above two taxa. Woodson's concept's require that these two species be considered as a segment of Cynanchum.

Matelea brasiliensis (Schltr.) Spellman, comb. nov.

Fimbristemma brasiliensis Schltr., Notizbl. 6: 178. 1914. BRAZIL: Vine near Seringal San Francisco, Alto Acre area, ca. 350 m. E. Ule 9529 (type collection).

This very distinct but little collected taxon is under the Woodson scheme quite clearly a Matelea. There are at this time no more than a half dozen collections available in herbaria in this country. The present distribution is interesting in that it is known from Brasil, Peru and Panama.

Since the holotype was located at Berlin, it is in all probability lost. Future examination of the genus may require choosing a lectotype if duplicates can be found elsewhere, perhaps Vienna.

TRIBAL REVISIONS IN THE ASTERACEAE. IV.

THE RELATIONSHIPS OF NEUROLAENA, SCHISTOCARPHA AND ALEPIDOCLINE.

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A number of genera placed in the Senecioneae have keeled anther appendages that mark them as relatives of the Helianthian-Helenian series. One small complex among these is further distinguished by paleaceous receptacles, having prominently graduated multiseriate involucre and having structures on the corollas that can be referred to as "Helianthian hairs". This complex includes the genera Neurolaena, Schistocarpha and Alepidocline.

Linnaeus treated the first known member of the complex under the name Conyza lobata. The species was later transferred to Calea and then placed by Brown (1817) in a new genus, Neurolaena, with the following explanation, ". . . Calea lobata, which Linnaeus, from the general appearance, I conclude, rather than from actual examination of the plant in Clifford's Herbarium, had referred to Conyza; and having no specimen in his own Herbarium, the twofold error of supposing it to belong to Polygamia superflua, and to have a naked receptacle, remained uncorrected in all his subsequent works." Brown went on to say, "Its real structure was first pointed out by Professor Swartz, who consequently referred it to Calea, with the character of which it exactly agrees. This alteration is adopted in the first edition of Hortus Kewensis, where the generic character of Calea is modified, to admit those species that are without pappus; and by Gaertner, who limits the genus to C. lobata and C. jamaicensis, as the only species that correspond with the Linnaean character. But as C. jamaicensis, the original species of Calea has been shown to have a pappus of a very different kind, it becomes necessary to give a new name to Calea lobata; . . ."

Cassini (1825) gave an admittedly poor disposition for the genus with the following statement, "Ce n'est qu'avec beaucoup d'hésitation que nous nous sommes décidé à comprendre ce genre dans notre tribu naturelle des Inulées, dont il s'éloigne sous plusieurs rapports, et surtout parce que le point de libération des filets des étamines se trouve précisément au sommet du tube de la corolle, tandis qu'il est beaucoup plus bas chez les autres Inulées. Ajoutons que les appendices basilaires de anthères sont nuls ou presque nuls; que le fruit et son aigrette sont très-analogues à ceux des Eupatoriées; que les stigmatophores, quoique privés de glandes, ressemblent à ceux des

Adénostylées. Le Neurolaena semble avoir aussi quelques points de contact avec les Tagétinées et avec les Astérées. Le principal motif qui nous a déterminé à ranger le Neurolaena parmi les Inulées, c'est que les deux espèces de Cassinia que nous avons observées, nous ont offert quelques-unes des anomalies du Neurolaena, qu'il y a des rapports notables entre ces deux genres, et que l'un d'eux, le Cassinia, étant évidemment attiré par ses affinités naturelles dans la Inulées, semble devoir y entraîner l'autre." Cassini went on to say, "On remarquera surtout que le Cassinia doit nécessairement être placé parmi les Inulées - Gnaphaliées, et que pourtant les filets de ses étamines sont greffés à la corolle jusqu'au sommet du tube, comme dans le Neurolaena. La forme du fruit, celle de la corolle, celle des étamines, offrent aussi quelques analogies avec le Neurolaena."

Neurolaena was apparently first placed close to Senecio by DeCandolle (1836) in his conspectus tribus Senecionideae. The two relevant subtribes were characterized as follows: "Heliantheae. Capitula saepius heterogama radiata aut homogama discoidea. Recept. totum aut marginw plaeaceum. Cor. fl. herm. lobi crassi. Pappus nullus coroniformis aut aristatus. Antherae nigricantes ecaudatae.— Folia saepius opposita" versus "Senecioneae. Capitula homo- aut heterogama, discoidea aut radiata. Antherae ecaudatae. Achaenio pappo piloso aut setaceo coronata, exteriora rarissime calva.— Folia alterna." On the basis of the pappus and alternate leaves Neurolaena was placed in the Senecioneae. Such a disposition has apparantly been followed by all more recent workers including Bentham (1873) who offered no explanation but only said "two species, admitted on all sides to be a Senecionid".

The second genus, Schistocarpha, was described by Lessing in 1831 with the brief comment "Differt a Neurochlaena R.Br. tantummodo pappo 1-nec 2-seriali". Decandolle (1836) placed the genus in the subtribe Heliantheae as a synonym of Perymenium. All other authors have kept Schistocarpha with Neurolaena in the Senecioneae.

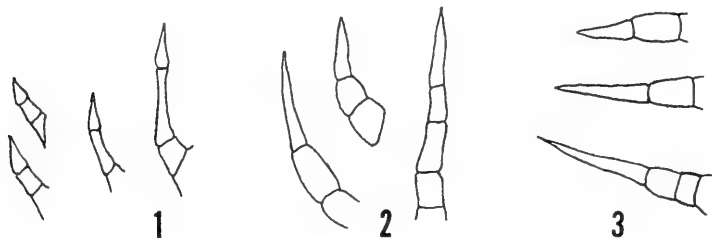
The third genus, Alepidocline, was placed by Blake (1934) as a relative of Schistocarpha but with the remark, "In its general appearance, Alepidocline is suggestive of the tribe Heliantheae".

Critical review of a number of features of the three genera Neurolaena, Schistocarpha and Alepidocline indicate that they should be placed in the Heliantheae. The conclusion is derived from improved understanding of the distribution of the following characters in the Asteraceae.

Receptacles: Neurolaena and Schistocarpha both have distinctly paleaceous receptacles. Alepidocline has paleae present toward the edge of the receptacle. Other genera with paleaceous receptacles that have been placed in the Senecioneae are Liabum

(Bentham, 1873) and Dyscritothamnus (Rzedowski, unpublished) neither of which really belongs to the tribe. On the basis of present knowledge the receptacles of the true Senecioneae never have paleae. Receptacles with paleae are most characteristic of the Heliantheae but occur also in many other tribes. The reduced number of paleae in Alepidocline might raise questions as to placement in the Heliantheae if all other characters were not so like Schistocarpha.

Phyllaries: Neurolaena, Schistocarpha and Alepidocline all show multiseriate graduated involucre bracts. These phyllaries are usually rather papery and distinctly multinerved. The appearance has often resulted in misidentification of specimens as



Figures 1-3. Helianthian hairs. 1. Neurolaena. 2. Schistocarpha. 3. Alepidocline.

Eupatorieae where such phyllaries are common. The Heliantheae have few genera with such phyllaries but some species of Calea are close. The Senecioneae do not have such involucre. Dr. Jose Cuatrecasas, who has worked extensively in the tribe has spoken often of the characteristic uni- or biseriate involucre of the Senecioneae where it occurs within a well developed imbricated calyculus in some species of Senecio.

Corolla hairs: Neurolaena, Schistocarpha and Alepidocline all show a type of trichome on the corolla which might be referred to as "Helianthian hairs" (Figures 1-3). These sharply pointed usually multicellular hairs are found on the corollas of most genera of Heliantheae. Such hairs are not found in any supposedly related tribes and do not occur in some groups within the Heliantheae such as the Coreopsinae. The presence of such hairs seems to be sufficient evidence for placement of a genus in the tribe. The genus, Raillardella, also shows such hairs on some species and on the basis of this, nectaries, and anther appendages seems to be a member of the Heliantheae though paleae are lacking in the genus and exact relationship is not known.

In contrast, corollas of the true Senecioneae seem to

usually have no pubescence at all. Ray corollas of some species have been seen with hairs or glands near the base but most rays and all disk flowers seen have been glabrous. Such a concept excludes from the tribe not only genera with helianthian hairs but also those with more lax or blunt corolla hairs such as Peucephyllum, Psathyrotes and Bartlettia.

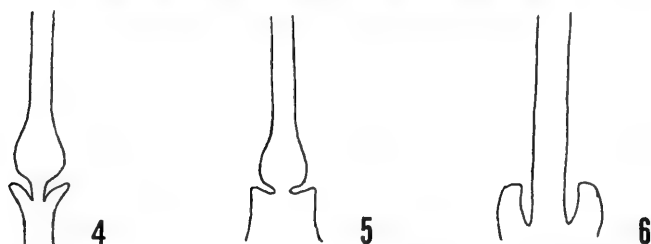
Corolla base: The long rather indistinct corolla bases of Neurolaena, Schistocarpha and Alepidocline are one of the two reasons the genera have not been placed in the Heliantheae by most authors. The corollas of the Heliantheae characteristically have shorter and very sharply demarcated basal tubes. The cells of the basal tubes also usually contain raphids but no raphids have been seen in Neurolaena, Schistocarpha or Alepidocline. The corolla bases are nevertheless not like those of the Senecioneae, but rather more like the Inuleae in which group Cassini placed Neurolaena.

Anther thecae: The thecae of Neurolaena, Schistocarpha and Alepidocline show the overlying layer of blackish exothecial cells so commonly found in Heliantheae. The regular exothecial cells are short with thickenings restricted to the transverse walls, a form most common in the Heliantheae. The bases of the thecae are also short-acute in the manner of the Heliantheae.

Anther appendages: The appendages of Neurolaena, Schistocarpha and Alepidocline show the concave or keeled structure that is characteristic of the Heliantheae and Helenieae. With a few dubious exceptions such appendages are not known in the Senecioneae. Such genera as Tussilago have appendages broad and inflexed but not truly concave. Crocidium seems to have the most nearly helianthian appendage of any genus that might be retained in the Senecioneae. Genera besides Neurolaena, Schistocarpha and Alepidocline that should be rejected from the Senecioneae on the basis of the anther appendage are Dyscritothamnus, Peucephyllum, Bartlettia, Psathyrotes and Raillardella.

In Neurolaena the anther appendage often bears a gland. Such glandular appendages are most common in the Heliantheae, and are found in the Helenieae, Inuleae and Vernonieae, but are not known in the Senecioneae.

Nectaries: The style bases of Neurolaena, Schistocarpha and Alepidocline are partially immersed in the nectaries (Fig. 4) as is characteristic of certain tribes including the Heliantheae. In contrast, the styles of the Senecioneae and Astereae along with some other compositae are borne on top of the nectaries or are completely fused with the nectary below the node (Fig. 5). The degree of fusion seems to be of considerable significance in distinguishing major trends in the family Asteraceae. Other genera that should be excluded from the Senecioneae on the basis



Figures 4-6. Nectaries and style bases. 4. Neurolaena. 5. Senecioneae. 6. Eupatorieae.

of the nectary are a dubious assemblage including Raillardella, Peucephyllum and Dyscritothamnus.

**Walls of achene:** Achenes of Neurolaena, Schistocarpha and Alepidocline observed under the microscope with transmitted light show three features of importance. Minute punctations on the cells under the surface are very pronounced. Such punctations are like those observed in most Eupatorieae and they are common among the genera of the Heliantheae. The second feature is the lack of raphids in all three genera. Raphids are mostly lacking when the minute punctations are present. The Senecioneae usually lack the punctations and have raphids. In the third feature of the achene wall the three genera in the complex are not alike. Schistocarpha and Alepidocline show the numerous narrow longitudinal plae lines in the walls that are common in many genera of the Heliantheae and that are found in some Helenieae. Neurolaena has no such lines and shows only the five differentiated costae as in some other Heliantheae and in most Eupatorieae.

**Pappus:** Neurolaena, Schistocarpha and Alepidocline have been excluded from the Heliantheae in the past primarily on the basis of their simple polysetose pappus. The pappus and the achenes in general were quite properly noted by Cassini for their resemblance to the Eupatorieae. Still, the previous delimitation of the Heliantheae on the basis of pappus seems particularly artificial considering the recognition of plumose and even short-setose forms of pappus in the tribe.

**Cytology:** Neurolaena has been reported twice with a chromosome number  $n = 11$  (Turner, Powell & King, 1962; Powell & King, 1969). Schistocarpha has been reported on the basis of ten counts and two species with  $n = 8$  (Turner, Ellis & King, 1961; Turner, Powell & King, 1962; Turner, Powell & Cuatrecasas, 1967; and Powell & King, 1969). The numbers are not particularly common

in the Heliantheae as shown in the review of the tribe (Solbrig, et al., 1972). Still, the numbers are easily encompassed within the over all pattern of the tribe. The chromosome numbers of the three genera are clearly unlike anything in the tribe Senecioneae where all known counts are on a base of 10 or more rarely are multiples of 5.

Conclusions: Neurolaena, Schistocarpha and Alepidocline, on the basis of receptacle, phyllaries, corolla hairs, nectaries, and anthers, are clearly to be excluded from the Senecioneae and included in the Heliantheae. The relationship to the Heliantheae is evident in spite of rather exceptional structure of the pappus and corolla base. The disposition confirms the impressions of Swartz and Brown regarding Neurolaena, the general impression of DeCandolle regarding Schistocarpha, and the impression of Blake regarding the habit of Alepidocline.

The three genera might be placed in a large Helianthian complex consisting of the Lagascinae - Verbesininae - Galinsoginae, being technically most like the Galinsoginae. Actually the three genera might better be accommodated in a broader more natural subtribal concept that included all three of the listed subtribes. A narrower concept might well result in a new subtribe. Such a separate subtribe would show some diversity since Neurolaena differs in many characters from Schistocarpha, including phyllotaxy, achene wall, corolla shape, gland on the anther appendage, and chromosome number.

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### THIRD EXPEDITION TO NICARAGUA

by  
Frank C. Seymour

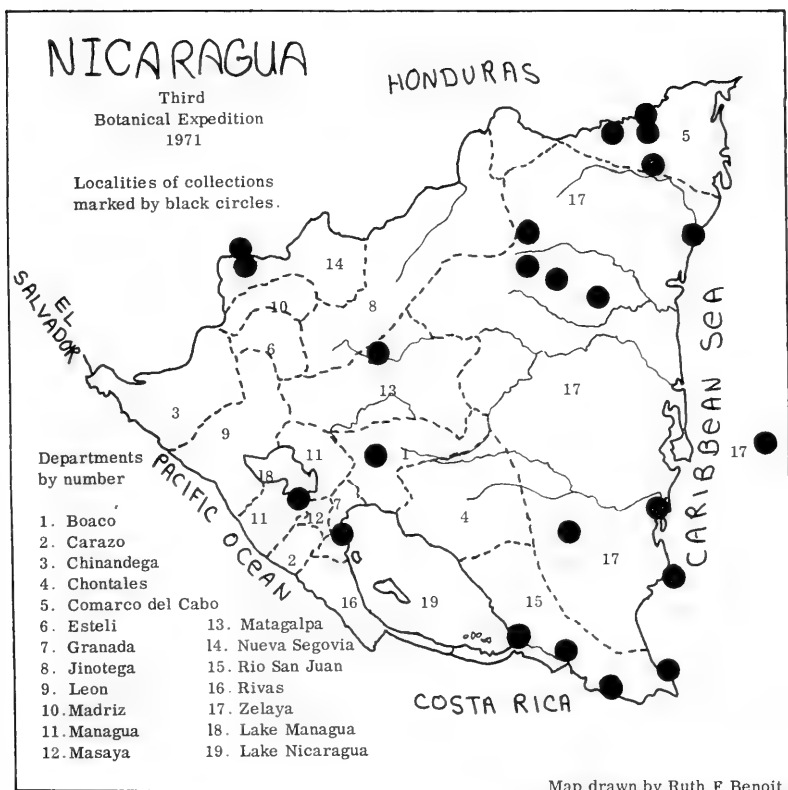
On our two previous expeditions having learned a little of how to get around the country, this time we attempted more difficult trips. We were ready for more adventurous localities. "We" refers to four adventurers, namely, E. Bruce Nelson, a graduate student in the University of Vermont in the Department of Geography, official photographer, and son-in-law of the senior member. Dr. Henry K. Svenson, an outstanding veteran botanist with a world-wide reputation for his work on the Cyperaceae. John T. Atwood, Jr., companion on both previous expeditions, majoring in Bromeliaceae and Orchidaceae. Frank C. Seymour, writer of this article was leader of all three expeditions.

As on previous expeditions, we were the guests of the Escuela Nacional de Agricultura y Ganaderia in Managua. We express our deep appreciation to Dr. Noel Somarriba B., Director, and his staff, for their hospitality and the use of their laboratory and other facilities. As is our custom, we gave a set of our specimens to the Escuela to be added to their herbarium. It is estimated that that herbarium now consists of 8,000 specimens.

Any botanist, seeing a specimen of a particular number and wanting to learn more of the circumstances, can do so by looking for the number in this article. That is the purpose of appending the collection numbers at the end of the account of each day.

The first member of our party to get down to work was Svenson, who collected on the very first day in the vicinity of the Escuela the following numbers: 3946-3952. None of us wasted much time. We rented an automobile on the same day February 27th, and started promptly the following morning, February 28th for some mountains in the northwest of Nicaragua on Route 5 near the city of Tuma, in the Department of Matagalpa. (A department corresponds to a state in the U. S. A.) With brilliant red orchids, Epidendrum ibaguense HBK., lining the roadside banks of clay, and Polypodium Lindenianum Kunze decking the trees, we collected in a cloud of falling mist. Due to lush growth all around us and plenty of species which none of us had ever seen before, our field presses were soon full and we were on our way back to the laboratory of the Escuela.

A mere 502 specimens were our booty for the day. Mileage amounted to 294 kilometers. Too weary to put all of them into laboratory presses that night, many of them were kept overnight to start drying



the next morning. This was our regular procedure. Usually, it took all day to reach a collecting spot and return, so that there was no time until the next morning to complete pressing. Atwood 3953- 3976, 4011-4022, 4057- 4069. Nelson 4023-4032, 4070-4072; Seymour 4033-4055, 4073-4081; Svenson 4056, 4082-4095.

On March 1st, near the Escuela, Svenson collected *Cyperus* sp. 4096.

Taking for a breathing spell only that one day, on March 2nd we rose shortly after 5 a. m. early enough to catch a 7 a. m. plane for Bluefields, located on the Caribbean east coast. This was the beginning of a circuit of several days before returning to the National School.

Bluefields is cut out of a former rain-forest. As the city was settled in early days by English pirates, English is still the prevailing language in spite of the fact that Spanish is the official language. A year ago at this time, almost the entire city had been burned to the ground by an uncontrollable fire. The flames were stopped just before they reached the Moravian Church. In the amazingly short space of about 14 months the city had come to life again and was almost entirely rebuilt.

Once we were settled in Hotel Cuelo, it was too late in the day to start a long trip into the surrounding country. In vacant lots of the city, Svenson 4097; Seymour 4098; Atwood 4099-4100. On meeting casually a German gentleman, Wilhelm Brockhaus, we received from him three numbers from a nearby rain-forest, 4101-4103, which included *Orthoclada laxa* (L. Rich.) Beauv., a species not found by any of our party.

By 8 a. m. the next morning, March 3rd, a taxi was hurrying us past tall trees and luxuriant woods through rain-forest. A farm did not seem a very promising collecting spot even if it had formerly been covered by rain-forest. Yet a brook running through pastures of the Jackson Farm provided a variety of habitat and afforded so much good material that our field presses were soon too full to add much more; yet we stopped here and there in the forest on the return to the city. Atwood 4104-4116, 4156-4163, 4182-4188; Nelson 4117-4123, 4164-4169, 4189-4193; Seymour 4124-4141, 4170-4178; Svenson 4142-4155 4179-4181.

Three members of our party made another sortie after 4 o'clock in the afternoon March 4th, to a place called Santa Mathilde, north of Bluefields. Atwood 4194-4202; Nelson 4203-4208; Svenson 4209-4213; Seymour collected in the city along a roadside 4214-4220.

Monkey Point or Punto Mico is such an alluring name that in our

fancy it seemed that where monkeys abound must be the home of startling new species and dazzling orchids. Chartering an ocean-going boat, we set out at 8 a. m., March 5th. For a few miles we managed to make ourselves think that the dashing spray and rolling boat were fun. By 11:15 when at last we reached monkey land we were heartily glad that half the trip was over.

To get ashore by dropping over the side into a dugout canoe, one needed to be a good monkey. Supporting a recently broken wrist, Seymour was not enough of a monkey to risk it. The others went ashore but by 3 o'clock when it was necessary to start back, we had very few specimens to show for the trip and had not yet found the new species or startling orchids or even the monkeys. On the return voyage, the boat pitched and rolled more than ever. All but Nelson were seasick. This disastrous trip cost us the modest sum of 150 cordovas or about \$20.00 apiece but at least we got a long ride for our money as we did not reach the wharf again until 8:30 p. m., long after dark. Atwood 4221-4245; Nelson 4246-4259.

Going aloft again by plane the following morning, March 6th, we landed where we had been hankering for a long time to go, namely, Corn Island. Offshore islands are sometimes extraordinarily interesting botanically, like Nantucket in New England. Truly, Corn Island is one of the most beautiful spots ever seen. In front of the Playa-coco Hotel, graceful palm trees lined the shore, while fishing boats reflected their images in the sea and gentle rolling waves punctuated the varying hues of blue and green of the water, unbroken by any glimpse of land in the distance. The beach is of soft clean sand and the water beautifully clean for swimming.

The principal industry of this Island is growing coconuts. So, into a coconut grove we strolled. There Cannas were growing wild, Canna edulis Ker. Ferns were frequent, including Vittaria minima (Baker) Benedict, Polypodium Palmeri Maxon, P. persicariifolium Schrader and others, with Thalia arundinacea L. Atwood 4260-4277; Nelson 4278-4290; Seymour 4291-4315. In another spot along shore, Svenson 4316-4320.

The coconut plantation did provide some interesting plants, some still unidentified, but not enough to keep us fully entertained all the time we were compelled to stay there. Yes, the time table clearly said the plane would stop to pick up passengers daily. Anyway, we had planned to move to our next stop in our circuit the next day, March 7th, so we packed up and drove to the airport. We waited. There was nothing else to do. The plane might arrive at any minute, so what was the use of trying to collect? Just as we might find an Ophioglossum, the plane would probably arrive and we should miss it. At long last, through the silent air came a voice saying, "The plane will not land to-

day." Back to the hotel we lugged our presses and suitcases. The same performance was repeated the following day and a third day with the same result.

March 7th, Corn Island, in a coconut plantation: Atwood 4321-4338; Nelson 4339-4345; Seymour 4346-4352.

March 8th, Corn Island, "Mt. Pleasant": Atwood 4353-4359; Nelson 4360-4370; Svenson 4371. In various spots, Svenson 4372-4384.

March 9th, Corn Island: Atwood 4385-4398; along the beach, Seymour 4399-4413. Waula Point, Svenson 4414-4422.

To add to our already heavy baggage by carrying newspapers from place to place seemed absurd. Not so in Nicaragua! We needed a large supply of newspapers to press our collections. There we were, marooned on an island. Our newspapers were already used up. No more were obtainable there! All our ventilators were in use and still some specimens were spoiling, enfolded in mere newspapers. Clearly we needed more equipment. It was up to someone to return to Managua to get it. Seymour was it!

On our last day on Corn Island, March 10th, the plane landed as scheduled. We clambered aboard with our luggage, Seymour to stay on the plane to reach Managua while the others disembarked at Puerto Cabezas. Before boarding the plane, Svenson collected 4423-4426.

March 11th, Puerto Cabezas, on the Caribbean coast, in a locality known as Santa Mathilde. Driving along the beach southward, a brief stop was in a mangrove swamp by an estuary. Atwood 4427-4459; Nelson 4460-4483; Svenson 4484-4514.

March 12th: Puerto Cabezas, again. Collected in a locality 3 miles west of the city in a pasture and island-forest in a savanna variously named Puente Septimo or Kamla or Tamla. Atwood 4515-4531; Nelson 4532-4535a. Proceeding to a spot 2 miles SE of the road to Waspan: Nelson 4536-4544; Svenson 4545-4564.

The two days at Puerto Cabezas brought us a rich harvest of species including a Spiranthes, 4 species of Utricularia, Burmannia capitata (Walter) Mart., 3 species of Polypodium, Eriocaulon decangulare L. f. parviceps Moldenke, 5 species of Scleria, Lindsaea stricta (Sw.) Dry., Adiantum obliquum Willd., 9 species of Rhynchospora, and many others. The Cyperaceae, except Scleria, have been identified by Svenson. The species of Scleria have been identified by John E. Fairy III.

March 13th. Just before leaving Puerto Cabezas, Svenson collected 4646-4660.

March 12th. In the meantime, Seymour had picked up additional equipment in Managua and was on his way to Waspan. On the plane he met Dr. Theodore H. Rights, the head of the Thaeler Memorial Hospital in Bilwaskarma. Together they had a few minutes during a plane stop in Bonanza and gathered a few samples; Seymour and Rights 4565-4571.

Bilwaskarma, where the Hospital is located, is very close to the northern, that is, the Honduran border, in Comarco del Cabo, very near to Waspan. It is surrounded by a pine-forest where the trees grow close together, not widely scattered as on the pine savannas usually seen. The scattered, sparse growth is due to burning-over the land repeatedly. The close stand of trees is possible because the land here has been protected, not burned over. As we approached by airplane, smoke of numerous such fires was seen scattered over the landscape.

We wish to express our deep appreciation to Dr. and Mrs. Theodore H. Rights and their staff in the hospital for their delightful hospitality.

On the afternoon of the 12th, Bro. William, of a nearby mission, took Seymour to Puente Pozo Azul on Kornuk Creek. This "Creek" flows through extensive pine savannas far from cities. The water is clear and cool so that swimming there is delightful. In other parts of the country, rivers are often muddy and polluted. The bridge is remarkable as a suspension bridge. At this point the Creek has cut a deep gorge in solid rock. Whether the swimming or the plants were the greater attraction, nowhere else did we find such a notable concentration of species unless in Puerto Cabezas. Here were many species of Panicum and Cyperaceae, Mayacca fluviatilis Aubl., Utricularia, Xyris, and several Melastomataceae. Seymour 4572-4603.

March 12th. On the return to Bilwaskarma through pine savannas, several other unusual species came to hand including a Coccocypselum sp. Seymour 4604-4618.

March 13th. The three men who went to Puerto Cabezas reached Bilwaskarma in the morning of this day. While waiting for their plane to arrive in Waspan, Seymour collected along a rill, in the pine savanna 4663-4669.

Promptly on arrival in the pine-forest on the grounds of the Hospital collecting began. The numbers for this day are not in chronological order. Atwood 4619-4628; Nelson 4629-4645; Rights 4661; Seymour

4662.

March 14th. Dr. Rights took us across the pine savanna to a strange densely tangled swamp at the base of a deep pocket or depression. Characteristic species here on the banks were Helicteres guazumaefolia HBK., Panicum Haenkeanum Presl and several Melastomataceae. In the swamp was a Scleria 4692 and a strange large unidentified grass 4693. Vittaria sp. 4671. Atwood 4670-4680; Nelson 4681-4691; Svenson 4692-4693; Seymour 4695-4719.

March 14th. Dr. Rights next took us to Puente Pozo Azul on Kornuk Creek, the same place visited yesterday by Seymour. Here we added to our list many species of Rhynchospora. Atwood 4720-4724; Seymour 4725-4744; Svenson 4745-4759.

March 14th. Upstream some distance we stopped again where Kornuk Creek was shallowly bubbling over loose stones, not in any deep gorge. In a shallow, stagnant pool were 2 species of Utricularia. Atwood 4760-4763; Nelson 4764-4769a; Svenson 4773-4776.

March 14th. On the return trip through the pine savanna, Seymour 4770-4772; Atwood 4777, a palm.

March 14th. Back in the pine forest at the Hospital, Rights 4778-4781; Seymour 4782-4786; Svenson 4787-4790.

For drying our specimens, we found here the best facilities anywhere. The electrical generator for the Mission sent forth a strong blast of hot air. Our presses, put right in that current of hot air, dried quickly.

March 15th. Bilwaskarma. Atwood 4791, Bromeliad.

March 15th. Waspan. Atwood 4792.

March 15th. Francia Sirpi or France ya Sirpi, between Waspan and Puerto Cabezas. Rain-forest. Eschatogramma panamensis C. Chr., Polypodium percussum Cav., Schizaea elegans (Vahl) Sw., and Trigonidium Egertonianum Batem. were among the species collected. Atwood 4793-4821; Nelson 4822-4832.

March 15th. Bilwaskarma, near the Hospital. In partly open scrubby area: Seymour 4833-4846; Svenson 4847-4853.

March 16th. Bilwaskarma near the Hospital: Svenson 4854.

March 16th. Waspan, in the pine savanna near the airport were

Orchidaceae and several species of Rhynchospora. Atwood 4855-4858; Nelson 4859-4864; Svenson 4865-4873.

March 16th. Siuna, Department Zelaya, is a mining town surrounded by mountains. Epidendrum difforme Jacq. Atwood 4874. We were delightfully entertained in the club house of the La Luz Mining Company. Delicious as Nicaraguan food is, it was pleasant for variety to enjoy here food cooked as in New England.

March 17th. Limbaikan, Department Zelaya, on Rio Prizapolca. We collected in open swampy land near the river where stagnant pools were frequent. Then we hiked along the road, westward, for a mile or so, back toward Siuna before being picked up by the truck. Among the species are Panicum laxum Sw., P. stagnatile H. & C., P. parvifolium Lam., P. zizanioides HBK. and Psidium Guajava L. Atwood 4875-4893; Nelson 4894-4916; Seymour 4917-4941; Svenson 4942-4961.

March 17th. Between Limbaikan and Siuna. After driving several miles toward Siuna, we stopped again in the pine savanna near some shallow, stagnant pools. Here were Panicum Rudgei R. & S., more than one species of Utricularia, Eriocaulon decangulare L. f. parviceps Moldenke, and many Cyperaceae. Atwood 4962-4970; Nelson 4971; Seymour 4972-4985; Svenson 4986-5006.

March 18th. Siuna. As far as the eye could see there appeared to be not more than one pond in Siuna. It was largely filled in by vegetation, especially Eichornia species. Atwood and Seymour collected along the shore of this pond. Typha domingensis Pers. and a large Polygonum were thriving. Although not usually taking any algae, here we made an exception of acquiring an abundant alga, probably Chara. Scarcely any fertile plants of a Nymphaea could be found. Atwood 5007-5017; Seymour 5018-5025.

March 19th. Siuna to Madregava. Transportation being available, we returned to Mt. Liveco where Seymour and Atwood had been a year ago. This is a luxuriant rain-forest. Whether our collections this year were merely what we had overlooked the year before or a new array of species had come into condition, either way we found an abundance of additional species, among them, Polypodium crassifolium L., Adiantum latifolium Lam., Olyra latifolia L., several Melastomataceae, Dichronema Watsoni Britton and Calyptrrocarya glomerulata, (Brongn.) Urban, and Neurolaena lobata (L.) R. Br. Atwood 5026-5043; Nelson 5044-5062; Seymour 5063-5090; Svenson 5091-5098.

March 20th. Siuna. While waiting for the plane to return us to Managua, Atwood 5099-5099a; Svenson 5100-5102.

March 20th. Managua, near the Escuela, along a parched dusty roadside: Svenson 5103, Kallstroemia sp.

March 21st. No collecting.

March 22nd. Plan Grande, Department Nueva Segovia, on the Honduran boundary. Renting an automobile again, we headed northward on the Pan American Highway, Route 1. Where it turns westward, at Yalaguina, we continued northward on Route 12 through Ocotol to Plan Grande. Just at this point our auto broke down. The gear stick pulled right out of its socket! We could go no farther. There being no choice, we collected where we were. Toward the end of the afternoon, some men working on the road made temporary repairs, enabling us to reach Ocotol by careful driving. There we obtained adequate repairs. Plan Grande is a region of dry very steep mountain slopes and deep valleys, covered by forest predominantly of pine. Atwood 5104-5110; Nelson 5111-5130; Seymour 5131-5161.

March 22nd. By accident, we crossed a few feet over the boundary from Plan Grande into Honduras in a place called Las Manos. Before a hasty return to Nicaraguan soil, Seymour found Hydrocotyle mexicana C. & S., 5162 and Gnaphalium spicatum Lam. 5163. Svenson, Carex cladostachya Sw. 5164 and Cyperus sp. 5165.

March 22nd. Managua, near the Escuela, Svenson, Dalechampia scandens L. 5166.

March 24th. On this date Svenson found it necessary to return to the States. From this day forward there were only 3 in our party, Atwood, Nelson and Seymour.

March 25th. We chartered a 4 passenger plane and left Managua at 8:45 a. m. for San Carlos, arriving there at 11 a. m. Seymour collected one number, 5167, Dichronema ciliata Vahl in the airport. After an early lunch, we loaded our equipment into a motor canoe, for which arrangements had been made many months beforehand. With Sr. Rene Espinoza, pilot, and an apprentice pilot, we set out promptly downstream on the Rio San Juan toward San Juan del Norte.

Without stopping, we reached El Castillo long before dark. Before retiring, we found time to climb over the ancient Spanish fort and collect a few specimens.

The fort is the scene of a decisive battle in 1780 in which the English, attempting to dislodge the Spanish, were defeated by forces under the command of the daughter of the commandant, he having been killed.

Atwood 5168-5185; Espinoza 5186-5189; Nelson 5190-5206; Seymour

5207-5219.

After searching a long time for accommodations, our pilot returned to report that not a single bed was available in the whole city. However, he found a barge where we slung our hammocks and spent a very comfortable night, entertaining ourselves by watching with a flashlight the huge spiders, (one with a leg-spread of six inches) crawling on the ceiling overhead.

March 26th. From El Castillo we made a prompt start this morning and continued through rapids down stream. Our only stop consisted of a few minutes on the south shore of Rio San Juan in a tiny hamlet called Boca San Carlos. On the muddy bank of the river, we gathered as much as time allowed. Atwood 5220-5222; Seymour 5223-5229.

March 26th. San Juan del Norte. Here we arrived by 2 p. m. The mayor of the city met us at the landing and invited us to be his guests. Hon. Aldric Beckford, Mayor, and his family, we thank for their warm friendliness and hospitality. They served us most delicious meals.

This city is located on the Caribbean Coast at the mouth of the Rio San Juan. It is characterized by low swampy level land.

The afternoon was spent in caring for the few specimens we had been able to collect during the two days coming down the river. In San Juan del Norte, we were able to collect this day, only one number: Seymour 5230.

March 27th. San Juan del Norte. Before and after breakfast, we put specimens as fast as we could into our field presses preparing to return up the river. The only habitat we had time to visit was an open swampy field along the river. Orchids were fairly plentiful. In the river, Eichornia azurea (Sw.) Kunth was superabundant associated with a still unidentified aquatic. Cabomba piauhensis Gardner was abundant and in fine condition. Two Utricularias were found, one a large species and abundant. Atwood 5231-5265; Nelson 5266-5284; Seymour 5285-5318.

March 27th. From San Juan del Norte to Delta. Starting promptly after lunch, we reached Delta by about nightfall. Unable to find a store where we could obtain food, we were barely able to find shelter under which to string our hammocks, so we were forced to go to sleep hungry. Needless to say, we accomplished no collecting here.

March 28th. Delta. Rising at about 5 a. m. we proceeded upstream without any breakfast. By 8 o'clock we reached a small village where we procured coffee and rolls. The sky was too cloudy to

enable us to do anything effective in drying specimens. 11 o'clock found us in El Castillo again where at last we had a good meal, the first in 24 hours. As we proceeded upstream, showers became more and more frequent, until it settled down to a steady rain. There was no encouragement to further stops along the way. By 4 o'clock we reached San Carlos again and were in the shelter of our hotel.

March 29th. San Carlos, Department Rio San Juan, being in the area of rain-forests, we were determined to get a sample of its vegetation. Hiking a short distance out of the city, we found some swampy woods which yielded a few noteworthy species such as Ceratopteris thalictroides (L.) Brongn., Oncidium pusillum (L.) Reichenb., Adiantum latifolium Lam. and in good fruit, Bixa Orellana L. In this swamp we had our only encounter with poisonous insects. Nelson walked unwittingly into a nest of some winged creature which we never stopped to identify. As he stumbled and floundered through mud, a swarm of them stung him many times about the face and hands. That night he was delirious but the next day he was apparently all right again. Atwood 5319-5328; Nelson 5329-5339; Seymour 5340-5355.

March 30th. Nueva Guinea, Department Zelaya, is a brand new city just carved out of the rain-forest along the Zapote River. (1965). Here, those whose homes had been destroyed about three months ago by the eruption of Cerro Negro - near Leon - were being resettled. Not realizing how unsettled conditions still were, we chartered an airplane and visited the city. People were standing in line to receive assignments of food, clothing and lodging. The locality produced little of botanical interest. Collecting was along lanes and roadsides in a banana plantation. Atwood 5356-5370; Nelson 5371-5382; Seymour 5383-5396.

March 31st. Nueva Guinea, airport. Atwood 5397.

April 1st. Managua near the Escuela. Seymour 5398.

April 2nd and 3rd. In Managua. No collecting.

April 4th. Boaco. Along the road to Boaco from Managua, nearly all rivers except in Tipitapa are completely dried up. The land is characteristically strewn with volcanic rocks of various sizes. Because this was Holy week we could not get beyond Boaco by taxi or auto, so we walked as far as we could toward Camouapa. The ground and vegetation were very dry. Atwood 5399-5412; Nelson 5413; Seymour 5414-5434.

April 5th. Managua near the Escuela. Seymour 5435-5437.

April 6th. Same place. Seymour 5438-5440.

April 7th. Same place. Seymour 5441-5443.

April 8th. Same place. Atwood 5444, Passiflora sp.; Seymour 5445-5449.

April 9th. Mombacho, Department Granada. Because it is one of the highest volcanic peaks in the country, to attain its summit is a continued challenge. Other collectors not associated with us have achieved it but none of our party had done so until today. The strange plants found there prove the value of more collecting. Our two men today were unable to carry back more than a few samples of the many choice plants growing there. Among them were Polypodium Wiesbaueri Sodiro, Ponera stricta Lindley, Elleanthus poiformis Schlecht. Seymour did not go on this trip. Nelson, although present, did not collect. Atwood 5450-5480.

April 9th. Managua near the Escuela; Seymour 5481, a Euphorbia.

April 10th. Managua (same place.) Atwood 5482, a Cyperus.

From April 10th until April 14th, our group remained in Managua but were unable to do any collecting. Frequently during this expedition our activities have been limited by the religious observance of Lent. While man pauses in his work for a week and more at this season, flowers continue to develop and blossom or come to fruit in utter disregard of man.

See accompanying map with locations of collections marked by circles.

# TROPICAL AMERICAN PLANTS, XIII

LOUIS O. WILLIAMS

Field Museum of Natural History

## BIGNONIACEAE

PSEUDOCALYMMA. - Mr. Sandwith has reviewed the status of Pseudocalymma alliaceum (Lam.) Sandwith (Kew Bull. 1953: 466. 1954). Lamarck's original specimen is sterile. Mr. Sandwith believed that there were two varieties of this species, based primarily on calyx size, but was unable to ascertain which one might go with the type. He used a novel procedure to solve his problem, describing var. microcalyx and var. macrocalyx since he was not able to determine which might have been var. alliaceum.

If it were necessary to solve the problem in this manner I believe Pseudocalymma alliaceum (Lam.) Sandwith (Bignonia alliacea Lam.) might well have been considered a nomen dubium, which it is, and the next available name taken up. The next available name is P. sagotii (Bur. & Schum.) Sandw. and this name I take up for use in the Flora of Guatemala, as follows:

PSEUDOCALYMMA SAGOTII var. SAGOTII. P. sagotii (Bur. & Schum.) Sandwith, Rec. Trav. Bot. Néerl. 34: 210. 1937. Adenocalymma sagotii Bur. & Schum. in Martius, Fl. Bras. 8(2): 110. 1896. A. macrocarpa Donn.-Sm. Bot. Gaz. 40: 9. 1905. A. hosmeca Pittier, Contr. U. S. Nat. Herb. 18: 256. 1917. Petastoma tonduzianum Kränzlin, Fedde Rep. Sp. Nov. 17: 56. 1921. Pseudocalymma macrocarpum Sandwith, Rec. Trav. Bot. Néerl. 34: 210. 1937. P. alliaceum var. microcalyx Sandwith, Kew Bull. 1953: 467. 1954.

PSEUDOCALYMMA SAGOTII (Bur. & Schum.) Sandwith, var. macrocalyx (Sandw.) L. Wms., comb. nov. P. alliaceum var. macrocalyx Sandwith, Kew Bull. 1953: 468. 1954. P. standleyi Steyerf. Field Mus. Bot. 23: 235. 1947.

This variety with large calyces is sparsely, and erratically, distributed from Guatemala to British Guiana and Brazil.

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Number XII of this series appeared in Fieldiana: Botany 34: 101-132. 1972.

## COMPOSITAE

GNAPHALIUM AECIDIOCEPHALUM (Grierson) L. Wms. comb. nov.

Anaphalis aecidiocephala Grierson, Notes Roy. Bot. Gard. Edinb. 31: 389, fig. 1972.

Mexico: in grass in sun, Cerro de Humo Chico, Comaltepeque, Ixtlán, Oaxaca, alt. 3,050 m., March 2, 1968, MacDougall 4129.\*

The collection cited above, which will be widely distributed, is from the same locality and collected on the same day as the holotype of the species; only the collection number is different.

Mr. Grierson has placed this most attractive species into DeCandolle's genus Anaphalis, the lectotype of which is Indian. He has transferred Gnaphalium concinnum Gray, a similar and rare Mexican species, to Anaphalis. There are as many as a half dozen Mexican and Guatemalan species that would need to be transferred to Anaphalis if Gnaphalium concinnum and G. aecidiocephalum were to be considered to belong to this segregate genus, and then by extension perhaps many more allied species. I consider it preferable to maintain the plants in Gnaphalium since there is no real assurance that these plants belong to the segregate genus.

## ORCHIDACEAE

PONTHIEVA PARVULA Schltr. in Fedde, Rep. Sp. Nov. 10: 394. 1912; Rep. Sp. Nov. Beih. 59, 2: t. 7, f. 28. 1931.

Guatemala: near Cobán, Alta Verapaz, Dec. 1879, Tuerckheim 484 (type collection); flowers white, growing on moist bank, cut-over and second growth forest, hills about 5 km. north of San Pedro Carchá, Alta Verapaz, approx. 15° 32' N, 90° 15' W, alt. 1,200 m., January 28, 1969, Williams, Molina, Williams & Molina 40223; flowers white, growing on moist rocky bank, cut-over pine forest and moist thickets, hills of Chicojil, about 10 km. north of San Pedro Carchá, Alta Verapaz, ± 15° 32' N, 90° 12' W, alt. 1,200 m., February 2, 1969, Williams et al. 404

The type of this rare species was probably lost at Berlin. Our collections, the first in 90 years, have been widely distributed to herbaria around the world. They come from the same general location as the original collection made by Tuerckheim in 1879.

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\* Thomas MacDougall, don Tomás to a host of friends, for whom I had planned to name this plant, died at Oaxaca, Mexico, in the country which he loved, on January 17, 1973.

## SPIRANTHES PETENENSIS L. Wms. sp. nov.

Plantae terrestres. Folia dua vel ultra e base plantarum, laminae ellipticae oblanceolatae vel oblanceolato-ovatae acuminatae; inflorescentia racemosa pauciflora, bractae lanceolatae; flores parvi albi; sepalum dorsale lanceolato-acutum obscure trinervium; sepala lateralia anguste oblonga acuta obscure trinervia; petala oblique oblanceolata bilobata obtusa 1-(2)-nervia; labellum anguste oblanceolatum obtusum callosum; rostellum trilobatum.

Terrestrial plants with 2 or more basal leaves and a slender, puberulent stem 15-25 cm. long, this terminated by a 10-20-flowered spikelike inflorescence. Leaves elliptic, oblanceolate or oblanceolate-ovate, acuminate, glabrous, thin and net-veined, petiolate, the blade 5-12 cm. long and 2-5 cm. broad and decurrent onto the 3-6 cm. long petioles; stem to 25 cm. long, covered with loose translucent bracts 2-4 cm. long, the inflorescence a loosely flowered spike 6-12 cm. long, subtending floral bracts lanceolate, acuminate, 8-15 mm. long; flowers small, white, cystoliths present; dorsal sepal lanceolate, acute, about 4 mm. long and 1.5 mm. broad, obscurely 3-nerved, puberulent dorsally; lateral sepals narrowly oblong, acute, long decurrent on the ovary, 5-6 mm. long, 2-(3)-nerved, obscurely puberulent dorsally; petals lightly adnate to the dorsal sepal, obliquely oblanceolate, the apex obscurely bilobate or obtuse, 1-(2)-nerved, about 4 mm. long and 1.2 mm. broad; lip narrowly oblanceolate, obtuse, about 5.5 mm. long and 1.2 mm. broad near the apex, the base with thickened marginal callosities about 1.5 mm. long, the lamina constricted above the base and again near the apex, with obscure callus-thickenings toward the apex; column about 2 mm. long and the column-foot about 2 mm. long; rostellum trilobate, thin, about 1.2 mm. long, the mid-lobe linear.

Guatemala: flor blanca, en bosque alto, ramonal-sapotol, en camino a Uaxactun a 1 km. de Tikal, Parque Nacional, Depto Petén, 6 enero 1969, Tun Ortiz 3 (type, F; EAF; others).

Closely related to S. cranichoides (Griseb.) Cogn. and to S. elata (Sw.) L. C. Rich. from both of which it is easily distinguished by the narrowly oblanceolate lip with marginal callus thickenings, by the lobate apices of the petals, the lateral sepals long decurrent on the ovary and the column-foot as long as the column. A forest species bearing leaves at anthesis.

The Orchidaceae is doubtless the best known and the most collected family of plants in Guatemala, as it is in other Central American countries. This is due, in part at least, to many amateur and professional botanists who have had a special interest in the family. Nevertheless, undescribed orchids turn up in nearly every large collection that comes in.

Forest orchids, whether terrestrial or epiphytic, are especially sensitive to changes in the environment and certainly many are becoming extinct with the increasing destruction of tropical forests everywhere.

## RUBIACEAE

*ALLENANTHUS HONDURENSIS* var. *PARVIFOLIA* L. Wms. var. nov.

Folia breviter petiolata, laminis lanceolatis vel ovato-lanceolatis acuminatis; corolla subcampanulata 4-lobata prope 2 mm. longam, lobis oblongo-ovatis obtusis prope 1 mm. longos.

Differs from the species in being smaller in most parts, the leaves short-petiolate, the blades lanceolate or ovate-lanceolate, acuminate, puberulent on both surfaces, 3.5-5.5 cm. long and 1.5-2.5 cm. broad; corolla subcampanulate, 4-lobate, about 2 mm. long, the lobes oblong-ovate, obtuse, about 1 mm. long; stamens inserted in the throat, the anthers 4, sessile, 0.5-0.6 mm. long; style bifid, equalling the corolla.

Mexico: flowers white, tree 20 feet tall, Rancho Carmen along road from Acala to Venustiano Carranza, Municipio de Venustiano Carranza, Chiapas, alt. 2,600 feet, 23 August 1966, Laughlin 1647 (type, F).

We find no differences from the Honduran specimens except that the Mexican specimen has much smaller leaves and inflorescences; the fruits seem identical. The separation in range is great and the genus is new to Mexico.

The genus is now known, so far as I am aware, from three limited localities: Valle de Antón in Panama, the Zamorano and Los Angeles valleys in Honduras, and from a single collection in Mexico. It is to be expected in Guatemala, and also in Nicaragua and Costa Rica on the Pacific slopes.

*CHIONE ALLENII* L. Wms. sp. nov.

Arbor 12-25-metralis omnino glabra. Folia elliptico-oblonga vel ovata obtusa subcoriacea, nerviis lateralibus utroque latere 8-10; inflorescentiae terminales pauci-multiflorae cymoso-corymbosae; hypanthium clavatum; calyx 5-lobatum, lobi late triangulares vel rotundati; corolla infundibuliformis leviter carnosae, lobis imbricatis late ovatis obtusis; stamina 5 lineari-oblonga; fructus anguste ovoideus.

Forest trees 12-25 meters tall and 30-45 cm. in diameter; branches glabrous, internodes on new growths 2-7 cm. long. Leaves elliptic-oblong to ovate, obtuse, subcoriaceous, lateral nerves mostly 8-10 pairs, completely glabrous except around cavities in nerve axils on lower leaf surface, the blades mostly 8-17 cm. long and 4-8 cm. broad, petioles mostly 1-1.5 cm. long; inflorescences terminal, (few-)many-flowered

corymbose cymes, shorter or about as long as the subtending leaves; flowers white, fragrant; hypanthium clavate; calyx 5-lobate, about 1.5-2 mm. long, the lobes broadly triangular or rounded, about 1 mm. long, persistent; corolla infundibuliform, somewhat fleshy, the lobes imbricate in bud, about 1 cm. long, the tube about 5 mm. long, the broadly ovate obtuse reflexed lobes about 5 mm. long; stamens inserted below middle of the corolla tube, filaments about 5 mm. long, anthers dorsifixed near the middle, linear-oblong, 4-4.5 mm. long; style bifid, the lobes flattened and stigmatic on inner faces; fruits narrowly ovoid, 1.5-2 cm. long and 0.5-0.8 cm. in diameter, bright red at maturity.

Costa Rica: fruits red, tree 50 feet, vicinity of Palmar Sur, alt. 100 feet, March 27, 1950, Allen 5506; fruits red, in pendulous clusters, tree 80 feet tall, esquinas forest, area between the Río Esquinas and Palmar, alt. 100 feet, July 8, 1949, Allen 5321; "fruta de pava," fruits red when mature; flowers white, tree 60-75 feet, frequent in forest, forested hills above Palmar Norte, alt. 830 m., Feb. 17, 1951, Allen 5930; flowers white with yellow stamens, very fragrant, tree to 40 feet, infrequent, forested hills near Golfito de Golfo Dulce, Provincia puntarenas, alt. 30 m., March 3, 1951, Allen 5990 (type, F).

This species is known only from near Golfo Dulce and was doubtless originally misdetermined by me as Chione costaricensis Standl. when Mr. Paul H. Allen had his "The Rainforests of Golfo Dulce" (Univ. of Florida Press, 1956) in preparation. Two of these specimens cited are mentioned on page 172 of Mr. Allen's work.

Chione allenii is related to C. costaricensis but is easily distinguished by the larger elliptic-oblong to ovate obtuse leaves, not elliptic-ovate or lanceolate short acuminate ones; by 8-10 pairs of lateral nerves, not 5-8 pairs; lateral nerves with ciliate formicaria in the axils, not glabrous; by the broadly triangular or rounded calyx lobes, not rotund-oblong ones. This species is known only along the Pacific slopes while C. costaricensis is known from the Atlantic slopes of Costa Rica and Nicaragua. Both are known from but few collections.

Standley commented in 1940 when he described Chione costaricensis that it was the first species from Central America. There are now six species known from Central America and Panama.

COCCOCYPSELUM HIRSUTUM var. GLABRUM (Bartling ex DC.) L. Wms. comb. nov. C. glabrum Bartling ex DC. Prodr. 4: 397. 1830. Tontanea glabra Standl. Journ. Wash. Acad. Sci. 15: 104. 1925.

A glabrous variation of C. hirsutum Bartling ex DC. known to me to occur in Guatemala, British Honduras, Nicaragua and Panama. The two known collections from Guatemala and Nicaragua were mixtures of the typical hirsute variety and the glabrous variety. I presume that

the variation is a minor genetic one. Since Coccocypselum hirsutum and C. glabrum were published in the same place and since the pubescent condition is the usual one in the genus, C. hirsutum is chosen as the typical one, var. hirsutum, and C. glabrum is reduced to var. glabrum.

HOFFMANNIA SESSILIFOLIA L. Wms. sp. nov.

Frutices graciles glabri usque ad 3 m. alti. Folia sessilia base obtusa subauriculata vel subcordata, oblanceolata vel oblongo-lanceolata acuminata; inflorescentiae axillares pauciflorae perbreves; calyx usque ad basem divisus, lobi lineari-oblongi sparse pubescentes; corolla 4-lobata, lobi lanceolati vel lanceolato-oblongi acuti; fructus desideratur.

Erect, slender, sparsely branched glabrous shrubs to 3 m. tall. The branches slender, terete with inconspicuous longitudinal raphides, the internodes at maturity 6-10 cm. long; leaves opposite, equal, rather large, sessile and obtuse to subauriculate or subcordate at the base, oblanceolate or oblong-lanceolate, acuminate, 5-16 cm. long and 2-5.5 cm. broad, green above, bright purple beneath but apparently becoming green with age, the lateral nerves 10-14 on each side, appearing somewhat white-marginate with age; inflorescences short, few-flowered axillary cymes, the peduncles 0.2-1 cm. long; flowers tinged with red; calyx and hypanthium 5-6 mm. long, the hypanthium 2-3 mm. long, glabrous, 8-ridged, the calyx divided to the base, the lobes linear-oblong, acute, 2.5-3 mm. long, sparsely pubescent or ciliate with segmented hairs, with minute glandular or hairlike appendages in the sinu; corolla 4-lobate, the lobes lanceolate or lance-oblong, acute, 6-7 mm. long, sparsely pubescent dorsally with large segmented hairs, the tube 3-4 mm. long; stamens attached below the throat of the corolla, 4-4.5 mm. long; style 9-10 mm. long, the stigmas somewhat enlarged and bilobate; fruits not known.

Guatemala: flowers tinged with red, leaves purple underneath, shrub to 3 m. on forest floor, wet cloud forest, Sierra de la Minas about 5 km. south of Furulhá, Dept. Baja Verapaz, alt. 1,600 m., January 2, 1973, Williams, Molina & Williams 41977 (F, type; EAF; US; others).

This is an addition to the rather numerous and often geographically restricted endemic species of the wet forests of the Central American highlands. The relatively little known genus Hoffmannia is one of the large genera in Central America with the greatest concentration of species occurring in Guatemala.

Hoffmannia sessilifolia has its nearest relative in H. ghiesbreghtii which is known from the same general region and extending to Mexico. Both are characterized by sessile or nearly sessile leaves, the only

species of North America lacking prominent petioles. Hoffmannia sessilifolia has sessile and usually very obtuse to subcordate leaves; the corolla tube half as long as the lobes which are pilose dorsally, the stems are terete. Hoffmannia ghiesbreghtii has sessile leaves but the base is long-attenuate and sometimes appears petiolate; the corolla tube is shorter than the lobes but glabrous and relatively small; the stems are winged.

The locality of this collection, made only three months ago, on the wet north slopes of the Sierra de las Minas, has probably not been visited by a botanist. A new road now makes it accessible to botanists, wood cutters, and lumbermen. The beautiful cloud forest certainly will all be gone within ten years, not because of excessive botanizing.



Hoffmannia sessilifolia. Illustration from the type to show variation in leaves; dissection to show detail of flowers.

## NEW SPECIES OF APHELANDRA (ACANTHACEAE)

Dieter C. Wasshausen  
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In number of species and in morphological diversity, the genus Aphelandra reaches its zenith in the Andean mountains of South America. While working towards a monograph of the genus, I found 29 species as yet undescribed to science. As a result of this, the following is an effort to place these novelties on record for the convenience of other taxonomists prior to the publication of the monograph in its entirety.

### 1. APHELANDRA FERREYRAE Wasshausen, sp. nov.

Herba; caulis parce adpresso-puberulus; lamina foliorum oblongo-elliptica, 21-25 cm longa et 6-7 cm lata, acuminata, glabra vel parce pilosa; spicae plures, oppositae, pedunculis et rachidibus puberulis, bracteis laxe imbricatis; bracteae virides, oblongo-ovatae, acuminatae et apiculatae, spinuloso-serratae; bracteolae oblongae, acutae; calycis segmenta oblonga, acuta, ciliolata; corolla flava, labiis subaequalibus, labio superiore bilobato lobis obtusis, inferiore trilobo, lobis rotundatis vel emarginatis.

Herb about 50 cm high; stem terete, rather sparingly appressed puberulent; leaf blades oblong-elliptic, 21-25 cm long and 6-7 cm wide, acuminate at apex, the tip itself blunt, cuneate at base, green, entire or obscurely crenate, glabrous or sparingly pilosulous, the hairs confined chiefly to the costa and lateral veins (about 12 pairs on each side of the costa); petioles to 6 cm long, minutely pilosulous; flowers borne in several, opposite spikes, these borne in the axils of the upper leaf blades, 15-18 cm long and 10-15 mm wide, the bracts rather loosely imbricate, the rachis and peduncles (3-5 cm long), puberulent, the hairs appressed or spreading toward tip of spike; bracts oblong-obovate, 10-13 mm long, 6 mm wide, acuminate, abruptly apiculate at tip, firm, green, puberulent, 5-7-nerved from middle to within 2 mm of tip, the nerves ending in about 6 erect-spreading, spiny teeth, these slender, to 1.5 mm long; bractlets oblong, 7 mm long, 1.5 mm wide, acute, pubescent toward tip, striate-nerved; posterior calyx segment about 8 mm long and 2.5 mm wide, the others 7 mm long and 1.5 mm wide, all oblong, acute, ciliolate toward tip, striate-nerved; corolla yellow, minutely pubescent, 2-2.5 cm long, the tube 2-3 mm wide at base, gradually enlarged to 6 mm at mouth, slightly curved, the lips subequal, the upper one obovate, 4-5 mm long and 6-10 mm wide, 2-lobed, the lobes 2-4 mm long, 3-5.5 mm wide, obtuse at apex, the lower lip 3-lobed, the middle lobe 4-7 mm long and 5-7 mm wide, the lateral lobes

similar but smaller, all rounded or emarginate at apex; stamens included; filaments 1 cm long, pubescent; anthers 3 mm long; ovary glabrous below, pubescent at tip; style about as long as the stamens, rather sparingly pilosulous; capsule not seen.

Type. R. Ferreyra 4333 (holotype US), Peru, Huánuco: Puento Tulumayo, between Tingo María and Divisoria, 700-750 m alt, 24 Jul 1948.

Distribution. Dense forests, Amazonian Peru in the departments of Loreto and Huánuco.

PERU. LORETO: Between Yurimaguas and Balsapuerto (lower Río Huallaga basin), 135-150 m alt, 26-31 Aug 1929, Killip & A. C. Smith 28254 (US). HUÁNUCO: Huánuco, Río Monzón, near Tingo María, 700 m alt, 21 Jun 1953, Ferreyra 9303 (US); Tingo María, marshy forest, 5 Aug 1940, Asplund 12745 (S); Leoncio Prado, 5 km S of Tingo María, 672 m alt, 4 Jul 1969, Schunke 3271 (F, US).

*Aphelandra ferreyrae* is closely affiliated with *A. parviflora*, a Colombian species. It is easily separated from *A. parviflora* by its green leaf blades and larger floral parts. In *A. parviflora* the leaf blades are purple beneath, the corolla 1.5 cm long or less, the bractlets lance-subulate and 3.5 mm long, and the calyx segments barely 6 mm long. In contrast, the corolla of this new Peruvian species is 2-2.5 cm long, the bractlets oblong and 7 mm long, and the calyx segments 7-8 mm long. This species is named in honor of Sr. Ramon Ferreyra, of the University of San Marcos, in recognition of his invaluable service to Peruvian botany.

## 2. APHELANDRA HAPALA Wasshausen, sp. nov.

Herba; caulis sursum dense strigosus; lamina foliorum elliptica, acuminata, supra glabra, subtus dense hirsuta; spicae terminales, pedunculatae, laxae, rhachidibus et pedunculis strigillosis; bracteae triangulares-ovatae, 8 mm longae et 5 mm latae, acuminatae et minute mucronatae; bracteolae triangulares-ovatae, acuminatae; calycis segmenta oblongo-ovata, striato-nervata, ciliolata; corolla aurantiaca, hirtella, labio superiore erecto, bilobato, lobis obovatis, abrupte acuminatis, labio inferiore 3-lobato, labio medio elliptico, lobis lateralibus obtusis.

Herb, 1.2-1.8 m high; stems subquadrangular, densely strigose above, the hairs yellowish-brown; leaf blades elliptic, 19-23 cm long, 8-9 cm wide, acuminate at both ends, the upper surface olivaceous, subnitid, glabrous, the lower surface yellowish-green, densely hirsute, the costa and lateral veins (11-13 pairs) conspicuous beneath, densely strigose; petioles (unwinged portion) 3-4 cm long, sparingly strigose; flowers borne in a terminal, peduncled, lax, spike, 10-12 cm long (without corollas), 2 cm wide, the peduncle 6-6.5 cm long, both rachis and peduncle densely strigillose with yellowish hairs; bracts triangular-ovate, 8 mm long and 5 mm wide at base, slenderly acuminate, terminating in a small spine, entire, glabrous toward base within, otherwise hirsutulous with

yellowish hairs, ciliolate; bractlets triangular-ovate, 8 mm long and 4 mm wide, abruptly and slenderly acuminate, spine-tipped, rounded at base, somewhat carinate, striate-nerved, sparingly hirtellous, the margins ciliolate; calyx segments oblong-ovate, spine-tipped, glabrous or minutely and rather sparingly puberulent, striate-nerved, the nerves callose below, the margins ciliolate, the posterior segment 12 mm long, 4.5 mm wide, abruptly acuminate, the anterior and lateral pairs 12 mm long, 2.5-4 mm wide, acute; corolla orange, hirtellous, 4.5-5.2 cm long, the tube 3.5 cm long, 3.5 mm wide at base, 6 mm wide at mouth, the upper lip erect, 17 mm long, 2-lobed, the lobes obovate, 6 mm long and 5 mm wide, short-acuminate, the lower lip 14 mm long, 3-lobed, the middle lobe elliptic, 12 mm long and 6 mm wide, the lateral lobes 14 mm long, 4 mm wide, all obtuse; stamens about equalling the corolla in length; anthers 6 mm long, mucronulate at base; ovary 4 mm long, glabrous; capsule not seen.

Type. R. Ferreyra 1670 (holotype US, isotype GH), Peru, Loreto: Divisoria, 1,600-1,800 m alt, 28 Feb 1947.

Distribution. Known only from the type locality.

A. hapala superficially resembles A. luyensis. In A. luyensis though, the leaf blades are finely serrate and spine-tipped and the corollas scarlet with yellow tubes. In A. hapala, the leaf blades are entire and the corollas orange.

### 3. APHELANDRA CAMPIL Wasshausen, sp. nov.

Suffrutex; caules teretes, glabri; lamina foliorum elliptica vel oblonga, acuminata (apice ipso obtuso), basi angustata, in petiolum decurrens, glabra vel parce puberula; spicae axillares et terminales, pedunculatae, pedunculis glabris; bracteae obovatae, 8 mm longae, 6 mm latae, apice obscure trilobatae, cuneatae, glabrae, intra glandulo-punctatae; bracteolae lanceolatae, striato-nervatae, glabrae; calycis segmenta lanceolata, subaequalia, striato-nervata, glabra; corolla lutea vel crenea, 2.8 cm longa, glabra, labio superiore bilobato, lobis rotundatis, labio inferiore 3-lobato, lobis obtusis vel rotundatis.

Suffrutescent, 1.5-2 m high; stems terete, glabrous; leaf blades elliptic to oblong, 13-14 cm long and 4.4-4.8 cm wide, acuminate (the tip blunt), gradually narrowed from above middle and attenuate at base, entire, submembranaceous, the upper surface deep-green, glabrous or sparingly and inconspicuously puberulous, the lower surface pale green, glabrous, black-punctate, the costa and lateral veins (11-13 pairs) slightly raised, glabrous, more conspicuous beneath than above; petioles (unwinged portion) 1.5-3 cm long, glabrous or sparingly puberulous; flowers borne in short, few-flowered, pedunculate spikes, these axillary and terminal, 2-3 cm long, 1 cm wide (without corollas) forming a thyrse, the peduncles 1.5-4 cm long, glabrous; bracts obovate, pale cream-green, 8 mm long, 6 mm wide, obscurely 3-lobed at apex, cuneate at base, glabrous, glandular-punctate, net-veined, the margins entire, reddish; bractlets lanceolate, 5 mm long, 1.5 mm wide, striate-nerved,

subhyaline, glabrous; calyx segments lanceolate, 5-6 mm long, striate-nerved, subhyaline, glabrous, the posterior segment 2 mm wide, acute, the anterior pair 1 mm wide, the lateral pair 0.5 mm wide, both pairs mucronulate at tip; corolla yellow or pale cream, 2.8 cm long, glabrous, the tube suberect, 25 mm long, 2 mm wide at base, 5 mm at mouth, the upper lip 2.5 mm long, the lobes 2 mm long and 1 mm wide, rounded, the lower lip 3-lobed, the middle lobe 2.5 mm in diam, the lateral lobes 2.5 mm long and 2 mm wide, all obtuse or rounded; stamens reaching the tip of the upper lip; anthers 2 mm long, arachnoid at tip; capsules elliptic, light brown, 10 mm long, 2.5 mm in diam, nitid, minutely pitted; seeds 2.5 mm long, 3 mm wide at base, muricate.

Type. W. H. Camp E-1371 (holotype US, isotype NY), Ecuador, Zamora-Chinchepe: Cordillera Cutucú, east-trending slope from top of ridge down toward the Itzintza, 1,440-1,740 m alt, 17 Nov-5 Dec 1944.

Distribution. Rare, in underbrush at edge of forest, in Ecuador and Peru.

PERU. HUÁNUCO: Río Tulumayu, affluent of Río Huallaga below Tingo María, hacienda LaVega, 1,000 m alt, 23 Oct 1947, Fosberg 28846 (US).

Aphelandra campii is perhaps nearest in relationship to A. jacobinioides Lindau, but differs markedly in that its leaves and bracts are much smaller and narrower, and, that its corolla and corolla lips are considerably shorter.

#### 4. APHELANDRA LATIBRACTEATA Wasshausen, sp. nov.

Frutex; caulis parce puberulus; lamina foliorum elliptica vel oblonga, breviter acuminata, basi angustata, in petiolum decurrens, glabra; spica 1 vel plures, terminales, subsessiles, pedunculis et rachidibus glabris vel puberulis; bracteae rubrae, obovatae, 16-18 mm longae, 12-13 mm latae, apice rotundatae; bracteolae oblongae, acutae, extus puberulae; calycis segmenta triangulares, subaequalia, acuta, ciliolata; corolla (immatura) subalba, puberula, labio superiore erecto, bilobato, labio inferiore 3-lobato, labio medio carente lobis lateralibus oblongis, obtusis.

Shrub 0.6-1.2 m high; stems minutely puberulent; leaf blades elliptic to oblong, 30-34 cm long, 9-11 cm wide, short-acuminate, narrowed at base and decurrent on the petiole, moderately firm, glabrous or the costa and lateral veins (11-13 pairs) bearing a few appressed hairs, the margins entire; petioles to 1.5 cm long, canaliculate, minutely puberulent; spikes stout, one or several, terminal, subsessile, 12.5-14 cm long, 2.5-3 cm broad, the peduncle about 1 cm long, it and the rachis glabrous or minutely and sparingly puberulent; bracts red, obovate, 16-18 mm long, 12-13 mm wide, rounded at apex, glabrous, subhyaline, striate-nerved, the margins entire; bractlets oblong, 10 mm long, 3.5 mm wide, acute, striate-nerved, minutely puberulous without; calyx segments triangular, subequal, 8-10 mm long, the posterior segment 3.5 mm wide near base, the anterior pair 3 mm wide, the lateral pair 2.5 mm wide,

all acute, striate-nerved, glabrous or minutely and inconspicuously puberulous, the margins ciliolate; corolla (immature) whitish, puberulent, 3 cm long, the tube 1.5 cm long, 4 mm wide at base, enlarged to 7 mm at mouth, the upper lip erect, 1-1.5 cm long, 2-lobed, the lower lip 3-lobed, the middle lobe missing, the lateral lobes oblong, about 5 mm long, 2 mm wide, obtuse; stamens almost reaching the upper lip; anthers 5 mm long, pubescent; stigma infundibular, 3 mm wide.

Type. *R. Ferreyra* 1908 (holotype US), Peru, Huánuco: Leoncio Prado, Río Supte, near Tingo María, 700-800 m alt, 9 Mar 1947.

Distribution. Known only from around the type locality.

PERU. HUÁNUCO: Puerto Inca, Bosque Nacional de Iparia, 500-600 m alt, 12 Dec 1968, *Schunke* 2863 (F, US).

*Aphelandra latibracteata* is not nearly allied to the other species. It superficially resembles *A. liboniana* from southern Brazil, however, this species has shorter leaf blades, much longer bract, and a larger, yellow (red toward apex) corolla.

##### 5. *APHELANDRA CUSCOENSIS* Wasshausen, sp. nov.

Suffrutex; caulis deorsum glaber, sursum parce sericeo; lamina foliorum haud lobata, elliptica, acuminata, basi angustata, serrata, venis spina terminatis, strigosa; spica solitaria, terminalis, rhachidi strigosa; bracteae rubrae, ellipticae, acutae, spinuloso-dentatae, sericeae; bracteolae lanceolatae, aristatae; calycis segmenta oblongo-lanceolata, apice acuminata, glabra, striato-nervata, ciliolata; corolla (immatura) coccinea, apice sericea.

Suffrutescent shrub about 1 m high; stems glabrous below, the upper portions sparingly sericeous, the hairs spreading, about 2 mm long; leaf blades elliptic, 30 cm long and 9.5 cm wide, acuminate, narrowed from middle or slightly below middle to a long-attenuate base, serrate, the veins terminating in sharp spines, 3-4 mm long, the upper surface sparingly strigose, the hairs about 1.5 mm long, the lower surface rather densely strigose, the hairs whitish, 1.5 mm long, subappressed, those of the costa and veins (about 18 pairs) spreading horizontally, the venation not very prominent but more so beneath than above; petioles about 5 mm long, strigose, the hairs spreading; spikes solitary, terminal, 12 cm long and 4 cm broad, moderately dense, the peduncle about 1.5 cm long, strigose, the rachis densely sericeous; bracts red, elliptic, about 35 mm long and 15 mm wide, acute, subchartaceous, conspicuously sericeous without, the margins spinose-toothed, the teeth (about 10 pairs) produced by the continuation of the lateral veins, successively larger and more spinose toward apex, the spines ascending, 3-4 mm long; bractlets lanceolate, 3.2 cm long, 4 mm wide, aristate, carinate, the keel puberulous and sericeous, subhyaline, striate-nerved; calyx segments oblong-lanceolate, the posterior segment 2.8 cm long and 3.5 mm wide, the anterior pair 2.6 cm long and 3 mm wide, the lateral pair 2 cm long and 2 mm wide, all long-acuminate at apex, glabrous, striate-nerved,

subhyaline, the margins ciliolate; corolla (immature) about 3.5 cm long, red, densely sericeous at tip, the hairs yellowish.

Type. C. Vargas 15415 (holotype US), Peru, Cusco: Quispicanchi, 520 m alt, 14 May 1964.

Distribution. Known only from type locality.

Aphelandra cuscoensis may be allied to A. rubra Wasshausen, which differs in its smaller (20 mm long), ovate, and acuminate bracts.

6. APHELANDRA PERUVIANA Wasshausen, sp. nov.

Frutex; caules quadrangulares, pilosi; lamina foliorum oblongo-elliptica, 20-23 cm longa, 6.5-10.5 cm lata, acuminata, cuneata, subtus glabrescent in costa et venis parce pubescens, marginibus undulato-dentatis, dentibus curvis et spinis terminatis; spicae densae, terminales, solitariae, 6-7 cm longae, rachidibus pilosis; bracteae laxae imbricatae, lanceolatae, subfalcatae, pilosae, marginibus repando-crenatis, ciliatae; bracteolae lanceolatae, subfalcatae, striato-nervatae; calycis segmenta subaequalia, striato-nervata; corolla purpurea, glanduloso-pilosa, labio superiore erecto, obovato, bilobato, labio inferiore 3-lobato, labio medio obovato, lobis lateralibus anguste ellipticis, acutis, cum labio superiore basi connatis.

Shrub; stems quadrangular, pilose, the hairs about 1 cm long; leaf blades oblong-elliptic, 20-23 cm long, 6.5-10.5 cm wide, acuminate, cuneate at base, glabrous and minutely faveolate above except the costa which is pubescent, the costa and lateral veins (14 or 15 pairs) strigillose, the lower surface otherwise glabrous or very sparingly pilosulous, the margins undulate-dentate, bordered by a pilose veinlike ridge, the teeth curved and tipped by a small spine about 0.5 mm long; petioles about 1 cm long, pilose; spike terminal, solitary, 6-7 cm long, about 2 cm in diam (excluding corollas), the bracts rather loosely imbricate and appressed, the rachis pilose; bracts lanceolate, subfalcate, 30 mm long, 4 mm wide at base, gradually narrowed to a slender tip, ending in a small spine 0.5 mm long, carinate and striate-nerved, moderately pilose, especially toward the base, the margins repand-crenate, ciliate; bractlets lanceolate, subfalcate, 25 mm long, 3.5 mm wide, acuminate, ending in a small spine, striate-nerved, pilosulous dorsally, the margins glabrous and subscarious except the tip; calyx segments unequal, striate-nerved, the nerves ending at base in a thickened callus, scarious-margined, glabrous below, pilosulous near the acuminate tip, the posterior segment narrowly lanceolate, 21 mm long, 4 mm wide at about 4 mm above base, the anterior pair linear, 19 mm long, 2.5 mm wide, the lateral pair 15 mm long, 2 mm wide; corolla purple, glandular-pilose, 6-7 cm long, the tube 4 cm long, 4 mm wide at base, narrowed to 2 mm at 7 mm above base, thence gradually enlarged to 9 mm at mouth, the upper lip erect, obovate, 20 mm long, 11 mm wide, 2-lobed, the lobes 10 mm long, 6 mm wide, oblique, acutish, the lower lip 3-lobed, the middle lobe obovate, 20 mm long, 10 mm wide, rounded, the lateral lobes narrowly elliptic, 15 mm long,

1.5-2 mm wide, acutish, partly adnate to the upper lip, the free portion about 10 mm long; stamens almost reaching the tip of upper lip; anthers 4 mm long, arcuate; ovary glabrous; style glabrous; capsule not seen.

Type. A. Weberbauer 6952 (holotype F, isotype GH), Peru, Cusco: Paucartambo, Cosñipata, 700-800 m alt, May 1914.

Distribution. Around Cusco, Peru, at elevations between 670-800 meters.

PERU. CUSCO: Paucartambo, Pilcopata-Keros, 780 m alt, 6 Mar 1964, Vargas 15249 (US); Salvacion-Cosñipata, 670 m alt, 8 Oct 1965, Vargas 16636 (US). WITHOUT EXACT LOCALITY: 1839-40, Gay s n (P).

Aphelandra peruviana is closely related to A. limbatifolia but differs markedly in the leaf blades, pubescence, and bracts. In A. limbatifolia the stems are pubescent only when young, becoming glabrous with age, the leaf blades are undulate, the bracts ovate, 15 mm long, 6 mm wide, and puberulent, the bractlets are 20 mm long, 4 mm wide and also puberulent, and the calyx segments 10-16 mm long. Contrasting to these characters, the stem of this new species is pilose, the leaf margins are dentate, the teeth ending in small spines, the bracts falcate, 30 mm long and 4 mm wide, pilose, the bractlets 25 mm long and 3.5 mm wide, and the calyx segments 15-21 mm long. The corollas of the two species appear to be nearly identical.

#### 7. APHELANDRA JUNINENSIS Wasshausen, sp. nov.

Frutex; caules quadrangulares, parce tomentosi; lamina haud lobata, foliorum oblongo-lanceolata, 21-24 cm longa et 5.5-6.5 cm lata, acuminata, cuneata, subcrassa, coriacea, glabra, marginibus serrato-dentatis, dentibus triangularibus, spina terminatis; spicae 1 vel plures, terminales et axillares, pedunculis et rachidibus tomentosis; bracteae virides, oblongo-ovatae, acuminatae et spina terminatae, spinosae, marginibus pilosis; bracteolae triangulo-ovatae, spina terminatae, extus pilosae, ciliatae; calycis segmenta lanceolata, subaequalia, acuminata et spina terminata, glanduloso-ciliata; corolla puberula, labio superiore erecto, elliptico, bilobato, labio inferiore 3-lobato, lobis obovatis, subaequalibus, erectis, obtusis.

Shrub; stems quadrangular, sparingly tomentose; leaf blades opposite or occasionally ternate, oblong-lanceolate, 21-24 cm long and 5.5-6.5 cm wide, gradually narrowed to a slender acuminate tip, cuneate at base, thick, firm, coriaceous, irregularly serrate-dentate, the teeth broadly triangular, armed with slender spines to 2 mm long, both surfaces glabrous except the costa and lateral nerves, these sometimes sparingly tomentose, the smaller veins forming a rather conspicuous reticulation; petioles about 1 cm long, sparingly tomentose; interpetiolar bracts minute, armed with one or more straight, slender spines; spikes one to several, terminal and in the axils of the upper leaves, short, 3-5.5 cm long, slender-peduncled, the

peduncles 1.5-5.5 cm long, these and the rachis tomentose; bracts green, oblong-ovate, 12-15 mm long, about 5 mm wide, rather abruptly acuminate, armed with about 6 slender spines on each side to 3.5 mm long and terminating in a similar spine, glabrous or the costa, base, and margins pilose; bractlets triangular-ovate, 10 mm long, 3 mm wide at base, gradually narrowed to a slender point tipped by a spine about 3 mm long, pilose without, glabrous within, one margin entire, the other bearing a pair of spines, one 0.5 mm long, the other 1 mm long, ciliate; calyx segments lanceolate, subequal, 10-11 mm long, 2-3 mm wide, slenderly acuminate, spine-tipped, glandular-ciliate; corolla puberulent, 3-3.5 cm long, the tube 3 mm broad at base, narrowed to 2 mm at 7 mm above base, thence gradually enlarged to 8 mm at mouth, the upper lip erect, recurved at tip, elliptic, 7 mm long and 5 mm wide, bilobed, the lobes obovate, 2 mm long and 2.5 mm wide, mucronulate, the lower lip 3-lobed, the lobes obovate, subequal, erect, the middle lobe 3 mm long and 6.5 mm wide, the lateral lobes 4 mm long and wide, all obtuse; stamens barely exerted beyond the mouth of the corolla tube; anthers 5 mm long, 1 mm wide, acute at both ends; capsule not seen.

Type. A. Weberbauer 6537 (holotype F, isotype GH), Peru, Junín: Huancayo, valley of Pariahuanca, between Panti and Rocchac, 2,400 m alt, Mar 1913.

Distribution. Known only from the type locality.

Aphelandra juninensis is closely allied with A. macrosiphon, from Bolivia. It has, however, relatively narrower leaf blades than the Bolivian species, oblong-ovate bracts rather than lanceolate, and triangular, slenderly acuminate bractlets rather than lanceolate ones as pictured on the type sheet of A. macrosiphon by Lindau.

#### 8. APHELANDRA WURDACKII Wasshausen, sp. nov.

Frutex; caules teretes, glabri vel parce puberuli; lamina foliorum elliptica vel oblonga, 8-11 cm longa et ad 4 cm lata, breviter acuminata, basi cuneata, serrata, dentibus spinis terminatis, glabra; spicae terminales et axillares, subsessiles, pedunculis et rhachidibus strigillosis; bracteae lanceolatae, apice acuminatae et spina terminatae, integrae, glabrae, subcoriaceae, ciliolatae; bracteolae lanceolatae, apice spina terminatae, glabrae, ciliatae; calycis segmenta lanceolata, subaequalia, acuminata et apice spina terminata, glabra, ciliata; corolla rosea, puberula, labio superiore erecto, oblongo, bilobato, apice retuso, labio inferiore 3-lobato, lobis ovatis, subaequalibus, obtusis.

Shrub 1-2.5 m high; stems terete, glabrous or minutely and inconspicuously puberulous; leaf blades elliptic to oblong, 8-11 cm long and to 4 cm wide, short-acuminate, the tip a short spine, cuneate at base, submembranaceous, serrate, the teeth rather closely set, 1-2 mm long, each terminating in sharp, straight, yellowish spines 1-2 mm long, the upper surface nitid, glabrous, the lower surface glabrous or the costa and lateral veins (8-13 pairs) sparingly and inconspicuously strigillose,

the costa and veins prominent beneath, more so than above; petioles to 5 mm long, sparingly strigillose; flowers borne in 5-6 spikes, these subsessile, terminal and in the axils of the upper leaves, 6-8 cm long, 1-2 cm wide, the peduncle about 1 cm long, both it and the rachis strigillose; bracts small, green, barely imbricate, entire, lanceolate, 6-7 mm long, 2 mm wide, acuminate and spine-tipped, glabrous, subcoriaceous, ciliolate; bractlets lanceolate, 6 mm long, 1.5 mm wide, subfalcate, gradually narrowed to a slender point tipped by a spine 0.5 mm long, glabrous, striate-nerved, ciliate; calyx segments lanceolate, subequal, 7 mm long, acuminate and spine-tipped, glabrous, ciliate, striate-nerved, the posterior segment 2.5 mm wide, the anterior pair 2 mm wide, the lateral pair 1.5 mm wide; corolla pink, puberulous, 4-4.5 cm long, the tube 4 mm broad at base, narrowed to 2 mm at 7 mm above base, thence gradually enlarged to 6 mm at mouth, the upper lip erect, oblong, 9 mm long and 4 mm wide, bilobed, the lobes elliptic, 5 mm long, 2.5 mm wide, retuse, the lower lip 3-lobed, the lobes ovate, subequal, spreading, the middle lobe 4 mm long and wide, the lateral lobes 4 mm long and 3 mm wide, all obtuse; stamens almost reaching the tip of the upper lip; anthers 4.5 mm long, 1 mm wide, acute and arachnoid; capsule oblong, 11 mm long, 6 mm broad, nitid, glabrous, minutely pitted; seeds dark brown, rugose, 3 mm in diam.

Type. J. Wurdack 1487 (holotype US, isotypes K, P), Peru, Amazonas: Chachapoyas, 1-2 km W of Molinopampa, along Río Ventilla, 2,350-2,400 m alt, 23-25 Jul 1962.

Distribution. Known only from around the type locality.

PERU. AMAZONAS: E of Leimebamba, 3,000 m alt, 20 Aug 1943, Evinger 496 (US).

Distantly related to Aphelandra tillettii Wasshausen, of Peru, A. wurdackii differs in having smaller and narrower leaf blades, shorter spikes, lanceolate bracts, and puberulous corolla.

#### 9. APHELANDRA TILLETII Wasshausen, sp. nov.

Frutex; caules teretes, glabri; lamina foliorum haud lobata, elliptica vel oblonga, breviter acuminata, basi cuneata, serrata, dentibus spinis terminatis, glabra; spicae terminales et subterminales, laxae; bracteae triangulo-ovatae, apice acuminatae et cuspidatae, glabrae, glanduloso-punctatae, subcoriaceae; bracteolae lanceolatae, apice spina terminatae, glabrae; calycis segmenta subulata, subaequalia, acuminata et apice spina terminata, glabra, ciliata; corolla basi aurantiaca vel coccinea, supra lutea, pilosa, labio superiore erecto, oblongo, bilobato, labio inferiore 3-lobato, lobo medio ovato, lobis lateralibus oblongis, obtusis.

Shrub with many ascending branches; stems terete, glabrous; leaf blades elliptic to oblong, about 15 cm long and 5-6 cm wide, short-acuminate, the tip itself a short spine, cuneate at base, firm, serrate, the teeth rather closely set, 1-2 mm long, each terminating in a sharp, ascending spine 1-2 mm long, the

upper surface grayish-green, glabrous, the lower surface similar, the costa and lateral veins (about 15 pairs) equally prominent on both surfaces; petioles 1.5-3 cm long, subquadragular, canaliculate, glabrous; interpetiolar bracts rhombate, 8 mm long and 3 mm wide, glabrous, narrowed at apex into a long, straight, yellowish spine about 3 mm long; flowers borne in lax terminal and subterminal spikes 11-15 cm long and 0.8 mm broad (excluding corollas), the peduncles 4-4.5 cm long, glabrous, the rachis subtomentose; bracts small, green, entire, triangular-ovate, 8-9 mm long, 3-4 mm wide, acuminate, the tip itself ending in a spine, glabrous, glandular-punctate, subcoriaceous; bractlets lanceolate, 7.5 mm long, 2 mm wide, gradually narrowed to a slender point tipped by a spine 1.5 mm long, glabrous, striate-nerved, ciliolate; calyx segments subulate, subequal, 8-9 mm long, acuminate and spine-tipped at apex, glabrous, ciliate, striate-nerved, the posterior segment 2 mm wide, the anterior pair 1.5 mm wide, the lateral pair 1 mm wide; corolla orange-red at base, shading to lighter and more yellow above, pilose, about 4 cm long, the tube 2.5 mm broad at base, thence gradually and obliquely enlarged to 6 mm at mouth, the upper lip erect, oblong, 7 mm long and 3 mm wide at base, minutely bilobed, the lobes 1 mm long and wide, acute, the lower lip 3-lobed, the lobes subequal, the middle lobe ovate, 2 mm long and 2.5 mm wide, the lateral lobes oblong, 2.5 mm long, 1.5 mm wide, all obtuse; stamens just reaching the mouth of the corolla tube; anthers 5 mm long, 1 mm wide, arachnoid at tip; capsule not seen.

Type. S. Tillett 673-291 (holotype US), Peru, Amazonas: Bongará, Yamborasbamba, 40 km N of Jumbilla, 1,860-2,000 m alt, 2 Mar 1967.

Distribution. Known only from the type locality.

Distantly related to Aphelandra wurdackii Wasshausen, of Peru, A. tillettii differs in having larger and broader leaf blades, longer spikes, triangular-ovate bracts, and pilose corolla.

#### 10. APHELANDRA DASYANTHA Wasshausen, sp. nov.

Frutex; caules teretes, strigosi; lamina foliorum haud lobata, oblonga vel ovata, breviter acuminata, basi angustata, supra strigosa, subtus strigillosa, tenuis, submembranacea, marginibus serrato-dentatis, dentibus spinis terminatis; spicae terminales et subterminales, pedunculis et rachidibus dense pilosis; bracteae lanceo-ovatae, acutae et spina terminatae, virides, strigosae, serrato-dentatae, dentibus spinis armatis; bracteolae lanceolatae, ciliatae; calycis segmenta lanceo-ovata, breviter acuminata et apice spina terminata, striato-nervata, ciliata; corolla coccinea, dense strigosa, labio superiore oblongo, erecto, bilobato, labio inferiore 3-lobato, lobo medio ovato, lobis lateralibus oblongis, obtusis.

Shrub 1-3 m high; stems terete, sparingly strigose; leaf blades oblong to ovate, 27-32 cm long, 12-14 cm wide, short-acuminate, gradually narrowed and attenuate at base, thin,

submembranaceous, the upper surface dark green, strigose, the lower surface paler green, densely strigillose, the margins serrate-dentate, the teeth to 2 mm long, tipped by a spine 1 mm long, ciliate, the costa and lateral veins (9-10 pairs) prominent, especially on the lower surface, the veinlets reticulate toward margins; petioles (unwinged portion) about 2 cm long, densely pilose; interpetiolar bracts ovate or suborbicular, 1 cm long, 6 mm wide, serrate-dentate, the teeth terminating in spines, the terminal one as much as 6 mm long; flowers borne in terminal and subterminal spikes 8-15 cm long and about 2.5 cm broad, the peduncles (about 3 cm long) and rachis densely pilose, the hairs yellowish-brown; bracts green, lance-ovate, 22 mm long, 8 mm wide (without spines), acute, terminating in a spine about 2 mm long, strigose, the margins serrate-dentate with 3 pairs of teeth, these ascending, 2 mm long, spine-tipped, the spines 3 mm long, ciliolate; bractlets lanceolate, 13 mm long, 3 mm wide, acuminate and spine-tipped, subcarinate, striate-nerved, sparingly pilose, the margins entire, ciliate; calyx segments lance-ovate, 6-7 mm long, 3.5-4 mm wide, short-acuminate and spine-tipped, the nerves callose below, striate-nerved, reticulate toward margins, puberulous, the margins ciliate; corolla red, 5-5.6 cm long, densely strigose, the hairs yellowish, the tube 4 mm broad at base, narrowed to 3 mm at 9 mm above base, thence gradually enlarged to 8 mm at mouth, the upper lip oblong, erect, 11 mm long, 5 mm wide, bilobed, the lobes ovate, 5 mm long, 2.5 mm wide, retuse, the lower lip 10 mm long, 3-lobed, the middle lobe ovate, concave, 6 mm long and 5 mm wide, obtuse, the lateral lobes oblong, 7 mm long, 3.5 mm wide, obtuse; stamens reaching the tip of the upper lip; anthers 6 mm long, 1 mm wide; capsule oblong, 15 mm long, 7 mm wide, nitid, glabrous; seeds triangular-ovate, 5 mm long, 3.5 mm broad, dark brown, muricate.

Type. Vidal-Sénèze s n (holotype P), Ecuador and Peru, 1876-1877.

Distribution. Southern Ecuador and northern Peru.

PERU. AMAZONAS: Bagua Chica, 25 Jan 1877, Vidal-Sénèze 4811 (P); San Carlos, 7 Feb 1877, Vidal-Sénèze 4833 (P); Guayabamba, 1877, Vidal-Sénèze s n (P).

Aphelandra dasyantha is not nearly allied to the other species.

# 11. APHELANDRA DUKEI Wasshausen, sp. nov.

Suffrutex; caules glaber vel subtomentosus, pilis sordidis, curvatis; lamina foliorum anguste lanceolata, acuminata (apice ipso obtuso), basi angustata, in petiolum decurrens, integra, glabra vel parce strigosa; spicae 1 vel plures, terminales, subsessiles; bracteae ellipticae, acuminatae, marginibus parce serratae; bracteolae lanceolatae, striato-nervatae, pilosulae; calycis segmenta subaequalia, ovata vel lanceolata, glabra, subhyalina, striato-nervata; corolla coccinea, 4 cm longa, parce puberula, minute papillosa, labiis subaequalibus, oblongo-ovatis, labio superior erecto, bilobato, lobis acuminatis,

curvatis, anguste triangularibus, labio inferiore patulo, integro, acuminato.

Suffrutescent shrub about 1 m high; stems erect, glabrous to subtomentose, the hairs sordid, variously curved, the internodes 1-5 cm long, the lenticels oval to linear, 1 mm long or less; leaf blades narrowly lanceolate, 12-15 cm long and 1-2 cm wide, acuminate (the tip obtuse), gradually narrowed and decurrent on the petiole, entire, firm, the upper surface dark green, glabrous or inconspicuously strigose, the costa impressed, this and the lateral veins (11-13 pairs) often strigose, the lower surface light green, glabrous or sparingly strigose, the hairs sordid; petioles (unwinged portion) 0.5-1.5 cm long, the pubescence that of the stem; flowers borne in one or several, terminal, subsessile spikes, these 9-14 cm long and 1-3 cm wide; bracts imbricate, green, elliptic, 15 mm long and 6 mm wide just above the middle, acuminate, sparingly sericeous both within and without, especially near the base, striate-nerved, bearing above the middle about 3 pairs of slender marginal teeth, these 0.5-2 mm long, spine-tipped and bearing near the middle of the dorsal surface, 2-7 small submarginal glands about 0.5 mm in diam; bractlets lanceolate, 10 mm long, 1-1.25 mm wide, striate-nerved, carinate, dorsally pilosulous; calyx segments subequal, ovate to lanceolate, 9-10 mm long, the posterior segment 2 mm wide, the lateral pair 1.25 mm wide, the anterior pair 1 mm wide, all finely striate-nerved, subhyaline, glabrous; corolla red, about 4 cm long, sparingly puberulent, minutely papillose, the tube subcylindric, 2 mm broad at base, constricted to 1.5 mm at 5 mm above base, about 4.5 mm broad at mouth, the lips oblong-ovate, 4.5-5 mm wide, subequal, the upper one erect, 10 mm long, 2-lobed, the lobes narrowly triangular, 5 mm long, 2 mm wide at base, acuminate, outwardly curved, the lower lip spreading, entire, acuminate, the tip recurved, or if 3-lobed, the lateral lobes vestigial, appearing as mere notches near the base of the upper lip; stamens exserted; capsule green, ovate, 12 mm long, 6 mm broad, acute, glabrous, minutely and inconspicuously punctate; mature seeds not seen.

Type. J. A. Duke 14397 (holotype US, isotype MO), Panama, Panama: Rio Bayano, 1-4 m above Piria, 100 m alt, 23 Sep 1967.

Distribution. Known only from around the type locality in Panama.

PANAMA. PANAMÁ: Along Pan-Am Highway, Río Canita near Janine, 24 Sep 1961, Duke 3840 (US); tributary of Río Chagres, 5 m SW of Cerro Brewster, 300 m alt, 14 Dec 1967, Lewis, Blackwell, Hawker, Little, Nowicke, & Oliver 3426 (MO).

Aphelandra dukei is perhaps nearest in relationship to A. deppeana, but differs markedly in its narrower, lanceolate leaf blades.

## 12. APHELANDRA HINTONII Wasshausen, sp. nov.

Suffrutex; caules subquadrangulares, glabri vel hirtelli; lamina foliorum ovata, acuminata (apice ipso obtuso), basi

angustata, in petiolum decurrens, supra strigillosa, subtus hirsuta; spicae terminales, sessiles, 8 cm longae, rachidi dense sericeus; bracteae viscidiae, coloratae, ovatae, 33 mm longae et 15 mm latae, acutae, cuneatae, glanduloso-pilosae; bracteolae lanceolatae, striato-nervatae, glanduloso-pilosae; calycis segmenta lanceolata, subaequalia, glandulo-pilosa; corolla coccinea, 6.5-7 cm longa, glanduloso-pilosa, labio superiore oblongo, erecto, integro, acuto, labio inferiore patulo, 3-lobato, lobis subaequalibus, labio medio obovato, labiis lateralibus late ellipticis.

Suffrutescent shrub; stems subquadrangular, glabrous to hirtellous; leaf blades ovate, 21-25 cm long, 9.5-12.5 cm wide, acuminate (the tip obtuse), narrowed and conspicuously attenuate at base, submembranaceous, entire or shallowly crenate, the upper surface dark-olivaceous, strigillose, the lower surface brownish-green, hirsute, the costa and lateral veins (12-15 pairs) prominent on the lower surface, densely hirsute; petioles (unwinged portion) 1.5 cm long, densely hirsute; flowers borne in a short, sessile, terminal spike 8 cm long and 3.5 cm wide (without corollas), subtended by a number of small, leaf blades near the base, these ovate, 9 cm long, 3.5-4 cm wide, the bracts densely imbricate, viscid, the rachis densely sericeous; bracts ovate, 33 mm long and 15 mm wide, acute, cuneate, colored, densely glandular-pilose, prominently 3-nerved, the margins entire, ciliate; bractlets lanceolate, subcarinate, 23 mm long, 4.5 mm wide, striate-nerved near base, the veinlets reticulate above middle, glandular-pilose; calyx segments lanceolate, 19-22 mm long, subequal, striate-nerved, glandular-pilose, the posterior segment 5.5 mm wide, the anterior pair 3.5 mm wide, the lateral pair 3 mm wide; corolla red, 6.5-7 cm long, glandular-pilose, the tube erect, 5 mm wide at base, narrowed to 4 mm at 8 mm above base, thence gradually enlarged to 9 mm at mouth, the upper lip oblong, erect, 2 cm long, 5 mm wide, entire, acute, the lower lip spreading, 3-lobed, the lobes subequal, the middle lobe obovate, 2 cm long, 1.5 cm wide, obtuse or rounded, the lateral lobes broadly elliptic, 1.5 cm long, 7 mm wide, acute; stamens exerted 1.6 cm beyond the mouth of the corolla tube; anthers 4.5 mm long, 1 mm wide, rounded at both ends; ovary 5 mm long, 2 mm wide, glabrous; capsule not seen.

Type. G. Hinton 16049 (holotype US, isotype NY), Mexico, Michoacán: Coalcoman, Naranjillo, 30 Oct 1941.

Distribution. Known only from the type locality.

This species, known only from one collection, is distinguished by its large and broad leaf blades, short terminal spike, large, glandular-pilose bracts, and the large size of the corolla. The shape of the leaves and flowers somewhat recalls A. madrensis Lindau, but the new species does not seem to be closely allied to any other species.

13. APHELANDRA DIFFUSA Wasshausen, sp. nov.

Planta patula; caules teretes, glabri vel parce puberuli;

lamina foliorum ovata, acuminata (apice ipso obtuso), basi angustata, glabra vel hirtella; spicae 1 vel plures, terminales 7-8 cm longae, pedunculatae, rachidi glanduloso-pilosula; bracteae rubrae, ovatae, 20-26 mm longae, acutae, cuneatae, viscidae, dense glanduloso-pilosae, ciliatae; bracteolae lineares, subcarinatae, aristatae, striato-nervatae, glanduloso-pilosae; calycis segmenta lanceolata, subaequalia, acuminata, striato-nervata, parce glandulo-pilosa; corolla aurantiaco-lutea, 4 cm longa, glanduloso-pilosa, labio superiore erecto, concavo, triangulo-ovato, integro, acuto, labio inferiore patulo, 3-lobato, lobis subaequalibus, labio medio obovato, lobis lateralibus ovatis.

Spreading plant 1.5 m high; stems terete, glabrous to sparingly and inconspicuously puberulous; leaf blades ovate, 13-15 cm long, 4.5-5 cm wide, submembranaceous, entire or shallowly undulate, acuminate (the tip obtuse), gradually narrowed and attenuate at base, the upper surface olivaceous, glabrous or sparingly hirtellous, the lower surface light-olivaceous, moderately hirtellous, the costa and lateral veins (11-12 pairs) inconspicuous above, rather prominent below, hirtellous; petioles (unwinged portion) 1.5 cm long, sparingly puberulous; flowers borne in one or several, terminal, peduncled spikes, these 7-8 cm long and 2.5 cm wide (without corollas), the bracts densely imbricate, viscid, the peduncle 3.5 cm long, sparingly puberulous, the rachis densely glandular-pilose; bracts reddish, ovate, 25-26 mm long, 9-10 mm wide, acute, cuneate, densely glandular-pilose, prominently 2-nerved at base, becoming reticulate above, the margins entire, ciliate; bractlets linear, subcarinate, 14 mm long and 1 mm wide, gradually narrowed to an aristate tip, subhyaline, striate-nerved, glandular-pilose; calyx segments lanceolate, 17 mm long, subequal, acuminate, striate-nerved, the nerves callose below, subhyaline, sparingly glandular-pilose, the posterior segment 3 mm wide, the anterior pair 2 mm wide, the lateral pair 1.5 mm wide; corolla orange-yellow (turning deep purplish-red with age), 4 cm long, glandular-pilose, the tube erect, 3 mm wide at base, gradually enlarged to 6 mm wide at mouth, the upper lip erect, concave, triangular-ovate, 12 mm long, 8 mm wide, entire, acute, the lower lip spreading, 3-lobed, the lobes subequal, the middle lobe obovate, 13 mm long, 8.5 mm wide, acute to obtuse, the lateral lobes ovate, 3.5 mm long, 2 mm wide, obtuse; stamens exserted 1 cm beyond the mouth of the corolla tube; anthers 4 mm long, arachnoid at tip, mucronate at base; style and stigma 3.6 cm long, puberulous at base, glabrous above; ovary 3.5 mm long, 1 mm wide, glabrous; capsule yellow, puberulous, elliptic, 15 mm long, 5 mm broad, acute; seeds (immature), muricate, 2.5 mm in diam.

Type. Jorgensen & Prieto JP-52 (holotype US, isotype NY), Ecuador, Loja: 46 km S of Loja, hacienda Anganuma, at headwaters of Río Cachiyaçu, on W slopes of Cordillera Condor, 1,800 m alt, 13-16 Jul 1944.

Distribution. Andean Ecuador and Peru, at elevations between 1,800 and 2,250 meters.

ECUADOR. BOLIVAR: André 796 (Poortman) (K). PERU.

PIURA: Cerro Porculla, 3-11 km W of Continental Divide down W slope of Cerro, 12 Jun 1966, Edwin & Schunke 3768 (F, US). CAJAMARCA: Llama (Cutervo), 2,250 m alt, Jul 1943, Sandeman 4082 (K).

*Aphelandra diffusa* superficially resembles *A. guayasii*. In *A. guayasii* though, the leaf blades are longer and broader, the bracts acuminate, shorter and narrower, and the corolla, as well as the limb, considerably longer and broader.

14. *APHELANDRA GALBA* Wasshausen, sp. nov.

Frutex; caules teretes, glabri vel parce puberuli; lamina foliorum oblongo-elliptica, breviter acuminata, basi angustata, in petiolum decurrens, integra; spicae 1 vel plures, terminales, subsessiles, 22-27 cm longae, rhachidi glanduloso-pilosula; bracteae grandes, aurantiacae, 27-28 mm longae et 10-12 mm latae, lanceo-ovatae, acutae, puberulae, ciliolatae; bracteolae lanceolatae, acuminatae, dense glanduloso-pilosae; calycis segmenta lanceolata, subaequalia; corolla flava, 3.5-4.5 cm longa, pubescens, labio superiore erecto, obovato, apice retuso, labio inferiore trilobato, labio medio obovato, lobis lateralibus ellipticis.

Shrubs to 1.5 m high; stems terete, glabrous or minutely and inconspicuously puberulous; leaf blades oblong to elliptic, 18-23 cm long and 5.5-6 cm wide, short-acuminate at apex (the tip itself blunt), narrowed at base and decurrent on the petiole, glabrous on the costa and lateral veins (16-18 pairs) minutely and inconspicuously puberulous beneath, the margins entire, the lower surface drying a much lighter green than the upper; petioles slender, 2-3 cm long, minutely puberulous; spikes stout, one or several, terminal, subsessile, 22-27 cm long and 2-3 cm broad (without corollas), the peduncle 0.5 cm long, the rachis glandular-pilosulous; bracts lance-ovate, pale orange, 27-28 mm long and 10-12 mm wide, acute, densely puberulous, prominently 3-nerved, the margins entire, ciliolate; bractlets lanceolate, 13 mm long, 1.5 mm wide, long-acuminate, densely glandular-pilosulous, striate-nerved, subhyaline; calyx segments lanceolate, subequal, 15 mm long, the posterior segment 3.5 mm wide near the middle, the anterior and lateral pairs 2.5 mm wide, all acute, striate-nerved, densely glandular-pilosulous; corolla canary yellow, 3.5-4.5 cm long, densely pubescent, the tube erect, about 3 cm long, 3 mm broad at base, thence gradually enlarged to 4 mm at mouth, the upper lip erect, obovate, 1.5 cm long, 9 mm wide, the tip retuse, the lower lip 3-lobed, the middle lobe obovate, 15 mm long, 11 mm wide, obtuse, the lateral lobes elliptic, 12 mm long, 6 mm wide, retuse at apex; stamens almost reaching the tip of the upper corolla lip; anthers 6 mm long, apiculate at apex; capsule not seen.

Type. W. H. Camp E-830 (holotype US, isotype NY), Ecuador, Zamora-Chinchepe: Valley of the Ríos Negro and Chupianza (on

trail from Sevilla de Oro to Mendez), 870-900 m alt, 1 Nov 1944.

Distribution. Known only from the type locality.

Aphelandra galba is not nearly allied to the other species. Readily distinguished from the other known Aphelandra by the combination of its long, stout spikes, large, pale orange bracts, and canary yellow corollas.

15. APHELANDRA DARIENENSIS Wasshausen, sp. nov.

Suffrutex; caulis deorsum glaber, sursum parce strigosus; lamina foliorum oblongo-elliptica, breviter acuminata, basi subobtusata, integra, sursum glabra vel parce strigosa, deorsum dense strigosa; spicae 1 vel plures, terminales, subsessiles, pedunculis strigosis, rachidi glabra; bracteae aurantiacae vel rubrae, 30 mm longae et 14-15 mm latae, ovatae, acutae vel obtusae, integrae, glabrae, ocelli plures; bracteolae lanceolatae, carinatae, carina dorso pubescente, striato-nervatae; calycis segmenta lanceolata, 13-15 mm longa, breviora quam bracteae, mucronulata, striato-nervata, glabra et glanduloso-punctata; corolla aurantiaca-coccinea, 6 cm longa, dense glanduloso-pilosa, labio superiore erecto, oblongo, bilobato, labio inferiore 3-lobato, lobo medio oblongo, lobis lateralibus similibus sed minoribus.

Low suffrutescent shrub; stems glabrous below, the upper portion sparingly strigose; leaf blades oblong-elliptic, 30-40 cm long, 9-14 cm wide, short-acuminate, narrowed from middle or slightly above to a narrow, obliquely subobtusate base, moderately firm, entire, the upper surface glabrous or sparingly and inconspicuously strigose, the lower surface rather densely strigose, especially the costa and lateral veins (17-22 pairs), the venation prominent but more so beneath than above; petioles 3.5-7 cm long, canaliculate, glabrous or sparingly strigose; spikes one or several, terminal, subsessile, 8-10 cm long, 3-4 cm wide (without corollas), moderately dense, the bracts imbricate, spreading with age, the peduncle about 1 cm long, strigose, the rachis glabrous; bracts orange to red, ovate, 30 mm long and 14-15 mm wide, acute to obtuse, coriaceous, often crisped and retrorse, closely veined, glabrous, the margins entire, ciliate, bearing just above the middle, near the margins, numerous minute ocelli, these forming a dull, alveolar spot, 3 mm long and 1 mm wide; bractlets lanceolate, 8 mm long and 2 mm wide, subhyaline, striate-nerved, carinate, especially the upper half, the keel pubescent; calyx segments lanceolate, 13-15 mm long, striate-nerved, subhyaline, glabrous, glandular-punctate, the posterior segment 5 mm wide, the anterior pair 3 mm wide, the lateral pair 2 mm wide, all mucronulate at apex; corolla orange-red, about 6 cm long, densely and minutely glandular-pilose, the tube 3.5 cm long, 3 mm wide at base, erect, gradually enlarged to 7 mm broad at mouth, the upper lip erect, oblong, 1.5 cm long, 2-lobed, the lobes triangular-ovate, 6 mm long, acute, the lower lip 3-lobed, the middle lobe oblong, 15 mm long, 8 mm wide, the lateral lobes similar but smaller; stamens

almost reaching the tip of the upper lip; anthers 9 mm long, apiculate at base; capsule not seen.

Type. Duke & Elias 13756 (holotype US, isotype MO), Panama, Darien: Cerro Pirre, 750-1,350 m alt, 9-10 Aug 1967.

Distribution. Submontane to mossy forests, at elevations above 600 meters, in the province of Darien, Panama.

PANAMA. DARIEN: Ascent of Cerro Pirre from R. Pirro S of El Real, 600-750 m alt, 11 Aug 1962, Duke 5313 (MO); Oct 1962, Duke 6101 (MO); Cerro Campamento (S of Cerro Pirre), 20-22 Mar 1968, Duke 15720 (US); between Tres Bocas and Cerro Campamento on Cuasi-Cana Trail, 1 May 1968, Kirkbride & Duke 1350 (MO).

Aphelandra darienensis is closely related to A. fernandezii Leonard, but the calyx segments as well as the corolla lips of that relative are considerably longer.

16. APHELANDRA KINGII Wasshausen, sp. nov.

Frutex parvus; caulis deorsum glaber, sursum dense strigosus; lamina foliorum elliptica vel oblonga, breviter acuminata, basi angustata, integra, supra parce strigosa, subtus dense strigosa; spica oblongo-ovata, rachidi glabra; bracteae rhombo-ovatae, 20-21 mm longae, integrae, acutae et minute mucronatae; bracteolae subulatae, glabrae; calycis segmenta striato-nervata, glabra, segmentum posterius et segmenta anteriora subulata; corolla ignota.

Small, suffrutescent shrub, about 0.5 m high; stem 7 mm in diam at base, glabrous below, upwardly becoming densely strigose; leaf blades elliptic to oblong, 13-16 cm long, 5-7 cm wide, abruptly acuminate at tip, narrowed at base to a short petiole 5 mm long, entire, sparingly strigose above, the lower surface densely strigose, the hairs about 2 mm long, the costa and lateral veins (about 7-9 pairs) rather prominent, more so than above; flowers borne in a sessile, terminal oblong-ovate spike about 7 cm long and 2.5 cm wide, the rachis glabrous; bracts imbricate, rhombic-ovate, 20-21 mm long, 15 mm wide, acute at apex, the tip itself a small mucro, cuneate at base, green, coriaceous, entire, striate-veined, bordered by a narrow subhyaline margin about 0.5 mm wide; bractlets subulate, 12 mm long, 2.5 mm wide, glabrous, each ending in a minute spine; calyx segments 8-9 mm long, glabrous, striate-veined, the posterior segment subulate, 2 mm wide, acuminate at apex, occasionally bearing a pair of minute teeth near the tip, the anterior pair subulate, 1.5 mm wide, acuminate at apex, the lateral pair conduplicate; corolla wanting; capsule oblong, 1.5 cm long, 5 mm wide, drying light brown, glabrous, apiculate at tip; seeds dark brown, 4 mm in diam, muricate.

Type. King & Guevara 6136 (holotype US), Colombia, Putumayo: 40 km NW of Puerto Asís, 300 m alt, 31 Jul 1965.

Distribution. Known only from the type locality.

Aphelandra kingii is closely related to A. boyacensis Leonard, but the bracts, bractlets, and calyx segments of that relative are considerably longer and wider.

17. *APHELANDRA PAULENSIS* Wasshausen, sp. nov.

Suffrutex; caules subquadrangulares, pilosi; lamina foliorum oblonga vel ovata, breviter acuminata (apice ipso obtuso), basi angustata, in petiolum decurrens, glabra vel parce strigosa; spicae 1 vel plures, terminales, sessiles, 7.5-8 cm longae, rachidi puberula; bracteae rubrae, oblongae vel ellipticae, 30 mm longae et 10-12 mm latae, ecarinatae, cuspidatae (apice ipso spinae), glabrae et minute glanduloso-punctatae; bracteolae lanceolatae, mucronulatae, glabrae; calycis segmenta lanceolata, subaequalia, glabra; corolla lutea, tubo glabro, labiis glandulosis, 3.5-4.5 cm longa, labio superiore patulo, obovato, bilobato, labio inferiore patulo, 3-lobato, lobis oblongis, obtusis.

Suffrutescent shrub; stems erect, subquadrangular, moderately pilose, the hairs sordid; leaf blades oblong to ovate, 13.5-18 cm long and 5.5-7 cm wide, short-acuminate (the tip obtuse), narrowed at base and decurrent on the petiole, submembranaceous, entire or shallowly undulate, the upper surface drying olivaceous, glabrous or sparingly strigose, the costa and lateral veins (11-14 pairs) slightly raised, scarcely conspicuous, the lower surface drying to pale olivaceous, glabrous or the costa and lateral veins sparingly strigose; petioles 2.5-3 cm long, glabrous to moderately pilose; flowers borne on one or several, terminal, sessile spikes, these 7.5-8 cm long and 2-2.5 cm wide (without corollas), the rachis puberulous; bracts imbricate, entire, red, coriaceous, oblong to elliptic, 30 mm long and 10-12 mm wide, cuspidate, the tip a spine about 1 mm long, glabrous and minutely glandular-punctate, ecarinate, reticulate-nerved; bractlets lanceolate, falcate, carinate, 10 mm long, 1.5 mm wide, acutish, the tip ending in a mucro, glabrous, striate-nerved, the marginal area bordered by a narrow subhyaline edging, the tip more or less ciliolate; calyx segments lanceolate, 17-18 mm long, subequal, the posterior segment 5 mm wide, the anterior pair 2.5 mm wide, the lateral segments 1.5 mm wide, all glabrous and striate-nerved, short-acuminate and minutely mucronate at tip; corolla yellow, the tube glabrous, the lips glandular-pilose, 3.5-4.5 cm long, 2 mm wide at base, 5.5 mm broad at mouth, the upper lip spreading, obovate, 14 mm long and 8 mm wide, bilobed, the lobes oblong, 4 mm long and wide, obtuse at tip, the middle lobe of the lower lip spreading, oblong, 17 mm long, 5 mm wide, the lateral lobes oblong, 15 mm long, 4 mm wide, obtuse; stamens exerted 12 mm beyond the mouth of the corolla tube; anthers 7 mm long, acute, mucronulate at base; capsule not seen.

Type. Kuhlmann & Gehrt s n (holotype US, isotype K), Brazil, São Paulo: Cunha, 16 Mar 1939.

Distribution. Known only from the type locality.

Aphelandra paulensis is distinguished from A. hirta, its nearest relative, by its cuspidate bracts, the tip a spine about 1 mm long, and the smaller corollas. The bracts of A. hirta are obtuse, the tip itself revolute and the corollas

4.5-5 cm long.

18. APHELANDRA NEPHOICA Wasshausen, sp. nov.

Herba erecta vel decumbens; caules parce strigosi; lamina foliorum oblongo-elliptica, breviter acuminata (apice ipso obtuso); spicae axillares, laxae, pedunculatae, rachidi strigosae; bracteae triangulares, 2 mm latae, acutae, ciliatae; bracteolae lanceolatae, acuminatae, ciliatae; calycis segmenta subaequalia, lanceolata, striato-nervata, glabra, ciliolata; corolla rosea, 1.8 cm longa, glabra, labiis subaequalibus, labio superiore bilobato, labio inferiore 3-lobato, lobis rotundatis.

Erect or decumbent herb to 50 cm high; stems terete, purplish, rather sparingly strigose; leaf blades oblong-elliptic, 8.5-11 cm long, 2.5-4 cm wide, short-acuminate at apex (the tip itself obtuse), long and narrowly decurrent on the petiole, firm, entire or shallowly undulate, the upper surface yellowish-green, strigillose, especially the costa and lateral veins (8-11 pairs), the lower surface light green, glabrous or the costa and lateral veins inconspicuously appressed-puberulous; petioles 1-1.5 cm long, strigillose; flowers borne in 2, lax, axillary, peduncled spikes, these 3-4 cm long, the rachis strigose, the hairs spreading, the peduncles 9-13 cm long, sparingly strigose; bracts erect, scarcely imbricate, triangular, 2.5-3 mm long and 2 mm wide, acute, green, entire, carinate, the margins densely ciliate; bractlets lanceolate, 2.5 mm long and 1 mm wide, acuminate, striate-nerved, green, ciliate; calyx segments subequal, lanceolate, 4.5 mm long, thinly scarious, striate-nerved, acute to acuminate, glabrous and minutely ciliate, the posterior segment 1.5 mm wide, the anterior pair 1 mm wide, the lateral pair 0.5 mm wide; corolla mauve-pink, 1.8 cm long, glabrous, the tube erect, 1.4 cm long, 2 mm wide at base, narrowed to 1 mm at 3 mm above base, thence gradually enlarged to 2.5 mm at mouth, the lobes of the lower lip broadly rounded, broadly cuneate toward base, the middle one 5 mm long and 3 mm wide, the lateral ones slightly smaller, the upper pair much smaller (4 mm long and 2 mm wide); stamens included, subequal; filaments epipetalous above the middle of the corolla tube; anthers oblong, obtuse, their tips cohering; ovary 1.5 mm long; capsule not seen.

Type. Grubb, Curry & Fernandez 651 (holotype US), Colombia, Boyaca: Sierra Nevada del Cocuy, between Bachira and Bocotá, 2,250 m alt, 21 Aug 1957.

Distribution. In cloud forests, known only from type locality.

Aphelandra nephoica is closely related to A. arnoldii, but the bracts of that relative bear a few minute teeth and its leaf blades are considerably longer and wider.

19. APHELANDRA CHRYSANTHA Wasshausen, sp. nov.

Suffrutex; caules subquadrangulares, subtomentosi; lamina foliorum haud lobata, oblonga vel elliptica, acuminata, basi angustata et obtusa, coriacea, glabra, marginibus serrato-

dentatis, dentibus triangularibus, spina terminatis; spicae terminales, pedunculatae, pedunculis et rachidibus glabris; bracteae subvirides, ovatae, coriaceae, acuminatae et spina terminatae, glabrae; bracteolae lanceolatae, glabrae, calycis segmenta flavo-virentia, subaequalia, oblongo-elliptica, acuta et mucronulata, striato-nervata, glabra; corolla lutea, glabra, labio superiore erecto, oblongo, obtuso, labio inferiore patulo, 3-lobato, lobo medio ovato, retuso, lobis lateralibus obtusis vel rotundatis.

Suffrutescent shrub, branched near base, 3 m high; stems subtomentose toward tips, subquadrangular; leaf blades oblong to elliptic, 17.5-18.5 cm long, 4.5-5 cm wide, acuminate, gradually narrowed and obtuse at base, firm, coriaceous, glabrous or the costa and veins (15-17 pairs) bearing a few weak hairs, the margins serrate-dentate, the teeth triangular, 4-7 mm high, ending in sharp spreading spines 3 mm long, the upper surface drying bright yellowish-green, the lower surface drying dull oliveaceous, the venation rather prominent below; petioles about 1.5 cm long, rather sparingly tomentose; interpetiolar bracts ovate or suborbiculate, 12 mm long, 7.5 mm wide, serrate-dentate, the teeth terminating in spines, the terminal one as much as 7 mm long; flowers borne in terminal, peduncled spikes 17-18.5 cm long and about 3 cm broad (the corollas excluded), the peduncle (about 7 cm long) and rachis glabrous; bracts pale green, ovate, 25 mm long, 13 mm wide, acuminate and spine-tipped, coriaceous, striate-nerved, entire, glabrous; bractlets lanceolate, 13-14 mm long, 5.5 mm wide, short-acuminate, the tip itself a small mucro, subcarinate, coriaceous, striate-nerved, glabrous; calyx segments pale yellowish-green, oblong-elliptic, 18 mm long, acute and mucronulate, striate-nerved, glabrous, subequal, the posterior one 6 mm wide, the anterior pair 5 mm wide and the lateral pair 4 mm wide; corolla bright yellow, glabrous, 5-5.5 cm long, the tube 4 mm broad at base, narrowed to 3 mm at 1 cm above base, thence gradually enlarged to 12 mm at mouth, the upper lip erect, oblong, 14 mm long, 8 mm wide, the tip obtuse and entire, the lower lip 3-lobed, more or less spreading, the middle lobe ovate, 6 mm long, 7.5 mm wide, retuse at apex, the lateral lobes 6 mm long, 7 mm wide, obtuse or rounded; stamens terminating at tip of upper corolla lip; anthers 8-9 mm long, arachnoid at tip, bearing a sterile theca; capsule ovate, 2 cm long, 9 mm broad, acute, dark-brown, nitid, minutely pitted; seeds muricate, dark brown, 5 mm long, 3 mm wide.

Type. W. H. Camp E-4291 (holotype US, isotype NY), Ecuador, Azuay: Eastern Cordillera, 1-8 km N of Sevilla de Oro, 2,400-2,700 m alt, 27 Jul 1945.

Distribution. Andean Ecuador in the provinces of Azuay and Loja at elevations between 1,600-2,800 meters.

ECUADOR. LOJA: Above Loja towards Catamayo, 2,800 m alt, 9 Oct 1955, Asplund 18060 (S); road from Loja to La Tuna, km 14-34, 1,600-2,600 m alt, 21 Nov 1961, Dodson & Thien 1515 (US); slopes of Cerro Villonaco, 10 km W of Loja, 2,400 m alt,

6 Mar 1966, Knight 520 (US).

Aphelandra chrysantha is closely related to A. phaina Wasshausen, but the bracts of that relative are reddish, the calyx red, and the corolla crimson.

20. APHELANDRA CINNABARINA Wasshausen, sp. nov.

Suffrutex; caules subquadrangulares, dense strigosi; lamina foliorum haud lobata, oblonga, 21-26 cm longa et 4.5-5.5 cm lata, acuminata et spinis terminata, basi angustata, strigosa; marginibus spinoso-dentatis, spicae 1 vel plures, terminales et subterminales, pedunculatae, rhachidi strigillosa; bractee lanceolatae, apice spina terminatae; bracteolae lanceolatae, apice spina terminatae, strigillosae, ciliolatae; calycis segmenta lanceolata, subaequalia, striato-nervata, glabra, ciliolata; corolla aurantiaco-coccinea, hirtella, labio superiore erecto, oblongo, bilobato, labio inferiore patulo, 3-lobato, lobis ovatis, subaequalibus, obtusis.

Suffrutescent shrub, 3 m high; stems subquadrangular, densely strigose; leaf blades oblong, 21-26 cm long and 4.5-5.5 cm wide, acuminate and spine-tipped, narrowed at base, submembranaceous, the margins spinose-dentate, the spines about 2 mm long, the upper surface deep green-subnitid, strigose, the lower surface pale green and dull, strigose, the costa and lateral veins numerous, more pronounced beneath than above; petioles about 1 cm long, densely strigose; interpetiolar bracts small, triangular, 3 mm long, sparingly strigose, the veins excurrent, ending in 1-5 straight, sharp, yellowish spines to 5 mm long, the middle one longer than the others; flowers borne in 1-6 terminal and subterminal, peduncled spikes, these 5-7 cm long and 1.5-2 cm wide, the peduncles 2-4 cm long, densely hirsute, the rachis strigillose; bracts entire, lanceolate, 10 mm long, 4 mm wide, gradually narrowed to a slender spine-tipped point, the lowermost bracts intergrading into stem leaves, these occasionally bearing several spine-tipped teeth on the margins, 3-nerved, strigillose, ciliate; bractlets lanceolate, 7 mm long, 2.5 mm wide, gradually narrowed to a slender spine-tipped point, one-nerved, faintly striate, strigillose, ciliate; calyx segments lanceolate, striate-nerved, glabrous, subequal, 8 mm long, acuminate and spine-tipped, distinctly callose at base, the posterior segment 3.5 mm wide, the anterior pair 3 mm wide, the lateral pair 2 mm wide, all ciliate; corolla orange-red without, the lobes internally yellow with red spots, hirtellous, 4-4.5 cm long, the tube 4 mm broad at base, narrowed to 2 mm at 4 mm above base, thence gradually enlarged to 8 mm at mouth, the upper lip erect, oblong, 10 mm long and 4 mm wide, bilobed, the lobes oblong, 4 mm long and 2.5 mm wide, acute, the lower lip spreading, 3-lobed, the lobes ovate, subequal, the middle lobe 4 mm long and wide, the lateral lobes 4 mm long and 3 mm wide, all obtuse; stamens almost reaching the tip of the upper lip; anthers 4.5 mm long, 1 mm wide, rounded at base, arachnoid at tip; capsule ovate, 15 mm long, 8 mm wide, nitid, glabrous, minutely pitted; seeds dark-brown, rugose, 5 mm long,

3 mm wide.

Type. W. H. Camp E-3374 (holotype US, isotype NY), Ecuador, Chimborazo: Cañon of the Río Chanchan, about 5 km N of Huigra, 1,500-1,950 m alt, 19-28 May 1945.

Distribution. Andean Ecuador, at elevations above 1,220 meters.

ECUADOR. AZUAY: Between Río Gamolotal and Río Huigra on road to Molleturo, 1,220-1,520 m alt, 10 Jun 1943, Steyermark 52915 (F).

Related to Aphelandra grangeri Leonard, of Colombia and Ecuador, A. cinnabarina differs markedly in its relatively longer, broader, and strigose leaf blades. The leaf blades of A. grangeri are to 14 cm long and 4 cm wide and glabrous.

21. APHELANDRA DODSONII Wasshausen, sp. nov.

Suffrutex; lamina foliorum ovata, acuminata, basi truncata, costa et venis prominentibus; spicae solitariae, terminales, sessiles, 21-22 cm longae, rachidi glabra; bracteae imbricatae, ovatae, rubrae, 11-12 mm latae, acutae, truncatae, glabrae, striato-nervatae; bracteolae lineari-filiformes, falcatae, glabrae, striato-nervatae; calycis segmenta triangulo-ovata, subaequalia, glabra, striato-nervata; corolla coccinea, glabra, 5 cm longa, labio superiore erecto, ovato, integro, labio inferiore patulo, 3-lobato, lobis ovatis, subaequalibus.

Suffrutescent, glabrous shrub to 1 m high; leaf blades ovate, 17-19 cm long, 7.5 cm wide, acuminate, ending in a blunt point, truncate at base, entire or undulate, green, the costa and lateral veins (11-12 pairs) rather prominent; petioles 5-5.5 cm long, canaliculate, glabrous; flowers borne on solitary, terminal, sessile spikes, 21-22 cm long, 1.5-2 cm wide (without corollas), the rachis glabrous; bracts imbricate, erect, entire, drying reddish, ovate, 30 mm long and 11-12 mm wide, acute at apex, truncate at base, glabrous, subchartaceous, striate-nerved; bractlets linear-filiform, 6 mm long and 1 mm wide, falcate, carinate, glabrous, striate-nerved; calyx segments triangular-ovate, 8 mm long, subequal, the posterior segment 3 mm wide at base, 2- or 3-toothed at tip, the anterior pair slightly over 2 mm wide and the lateral segments 3 mm wide, acuminate, the tip itself a spine 1 mm long, all glabrous, striate-nerved; corolla bright red, glabrous, 5 cm long from base to tip of upper lip, the tube gradually enlarged from 3 mm in diam at base to 6 mm broad at mouth, the upper lip erect, ovate, 20 mm long and 11 mm wide, entire, acute, the lower lip spreading, 3-lobed, the lobes ovate, subequal, the middle lobe 20 mm long and 9 mm wide, acute, the lateral lobes 15 mm long and 7 mm wide, acuminate; stamens exerted about 13 mm beyond the mouth of the corolla tube; anthers 5 mm long, 0.75 mm broad, acute at both ends; staminode lobulate, 0.25 mm long; capsule not seen.

Type. Dodson & Thien 1612 (holotype US), Ecuador, Carchi: Railroad from Ibaña to San Lorenzo, km #78, Río Blanco, 1,400-1,500 m alt, 14 Dec 1961.

Distribution. Known only from the type locality.

This species is readily distinguished by the long, solitary spike, the entire, reddish bracts, and the bright red corolla. It is not very closely allied to any of the known species of Aphelandra.

22. APHELANDRA ATTENUATA Wasshausen, sp. nov.

Frutex erectus; caules quadrangulares, puberuli; lamina foliorum elliptica vel oblonga, 6-7.5 cm lata, breviter acuminata, basi angustata, in petiolum decurrens, integra, utrinque glabra vel subtus in costa et venis parce puberula; spicae 1 vel plures, terminales, subsessiles, pedunculis puberulis, rachidi glabra; bracteae rubrae, ovatae, obtusae, 10-11 mm latae, integrae, coriaceae, costa prominente, areola elliptica opaca, alveolata, nigro-brunnescente, pro ocellis substituta; bracteolae lanceo-ovatae, subacutae; calycis segmenta oblonga, subaequalia, bracteas superantia, glabra, striato-nervata; corolla coccinea vel aurantiaca, 6 cm longa, glabra et dense papillosa, labio superiore erecto, ovato, bilobato, labio inferiore patulo, 3-lobato, lobo medio oblongo, apice submucronato, recurvato, lobis lateralibus parvis, cum labio superiore basi connatis.

An erect, soft-wooded shrub 2.4-3 m high; stems quadrangular toward tip, puberulous; leaf blades elliptic to oblong, 24-27 cm long and 6-7.5 cm wide, short-acuminate (the tip itself rounded), narrowed at base and decurrent on the petiole, submembranaceous, entire or shallowly undulate, the upper surface drying olivaceous, glabrous, the costa and lateral veins (14-15 pairs) slightly raised, scarcely conspicuous, the lower surface drying to grayish olivaceous, glabrous or the costa and lateral veins sparingly puberulous; petioles (unwinged portion) 1-2.5 cm long, the pubescence similar to that of the stem; flowers borne on one or several, terminal, subsessile spikes, these 10-11 cm long and 1.5-2 cm wide, the peduncle 7-8 mm long, densely puberulous, the rachis glabrous; bracts imbricate, entire, red, coriaceous, ovate, 11-12 mm long and 10-11 mm wide, obtuse, glabrous, the costa rather prominent, the flanking nerves fairly prominent except toward tip, ocelli replaced by elliptical, dull blackish-brown faveolate areas 2 mm long and 1 mm wide; bractlets lance-ovate, falcate, carinate, 10 mm long, 4 mm wide, acutish, the costa and keel densely hirsute, the marginal area glabrous, bordered by a narrow subhyaline edging, the tip more or less ciliate; calyx segments oblong, 12-13 mm long, subequal, the posterior segment 7 mm wide, the anterior pair slightly over 4.5 mm wide, the lateral segments 3.5 mm wide, all glabrous and striate-nerved, ciliate, rounded and minutely mucronate at tip, indurate at base; corolla red or orange, glabrous and densely papillose, 6 cm long from base to tip of upper lip, 3 mm broad at base, 6 mm broad at mouth, the upper lip erect, ovate, 22 mm long and 9 mm wide, bilobed at tip, the lobes triangular, 9 mm long, 4 mm wide, acute, the lower lip spreading, 3-lobed, the middle lobe of the lower lip oblong, 2.5 cm long, 7 mm wide, the submucronate tip

slightly recurved, the lateral lobes 6.5 mm long, partly adnate to the lower part of the upper lip, their free portions 1 mm long and 1 mm wide, acute; stamens exserted about 2 cm beyond the mouth of the corolla tube; anthers 9 mm long, 1 mm broad, acute; capsule not seen.

Type. Dodson & Thien 1647 (holotype US), Ecuador, Guayas: Manglaralto, 0-50 m alt, 20 Dec 1961.

Distribution. In Ecuador at elevations below 600 meters.

ECUADOR. EL ORO: Between Santa Rosa and La Chorita, 0-100 m alt, 27 Aug 1923, Hitchcock 21117 (US). PICHINCHA: 40 km SW of Santo Domingo on east bank of Río Peripa, 250 m alt, 3 Nov 1961, Dodson & Thien 1250 (MO, US). LOS RÍOS: Montalvo, Bosque de Oro near Hac. Las Balsas, 300-400 m alt, 28 Jun 1964, Jativa & Epling 639 (US). NAPO-PASTAZA: Tena, 27 Sep 1939, Asplund 8879 (S); between Tena and Archidona, 9 Oct 1939, Asplund 9185 (S); Cerro Antisana, secondary forest N of Tena, 600 m alt, Grubb, Lloyd, Pennington & Whitmore 14 (K, NY, Q); Río Aguarrico, Santo Cecilia, 220 m alt, 24 Nov 1966, Sparre 13119, 13122 (S); 60 km along Río Payamino, W of Coca, 350 m alt, 18 Jun 1968, Holm-Nielsen & Jeppesen 743 (AAU, US). WITHOUT EXACT LOCALITY. Ecuador, Warscewicz s n (B, destroyed, F photo 8698); junction of the Provinces of GUAYAS, CAÑAR, CHIMBORAZO & BOLIVAR: Foothills of the western cordillera near Bucay, 300-375 m alt, 8-15 Jun 1945, Camp E-3667 (NY, US); Bolivar (probably Ecuador), Jul 1884, Veitch s n (K).

This species is very similar in general aspect to Aphelandra crenata Leonard, but its narrower, entire or shallowly undulate leaf blades, shorter calyx segments, and shorter corollas, set it well apart.

### 23. APHELANDRA STEYERMARKII Wasshausen, sp. nov.

Suffrutex; caules sursum strigillosi, deorsum glabri; lamina foliorum elliptica vel oblonga, acuminata, basi angustata, membranacea, integra, strigillosa; spicae terminales, solitariae, subsessiles, rachidibus dense sericis; bracteae lanceolatae, acuminatae, integrae, dense sericeae; bracteolae lanceolatae, dense sericeae; calycis segmenta subaequalia, striato-nervata, sericea; corolla aurantiaca, 5.5-6 cm longa, glabra limbo excepto, labio superiore erecto, ovato, bilobato, labio inferiore 3-lobato, lobo medio oblongo, lobis lateralibus linearibus, cum labio superiore basi connatis.

Shrub; stems subquadrangular, strigillose above glabrate below; leaf blades elliptic to oblong, 11-15 cm long, 3.5-5 cm wide, acuminate, gradually narrowed at base, membranous, entire, the upper surface inconspicuously strigillose, dark green, the lower surface pale green, strigillose, particularly the costa and lateral veins (about 7 pairs), these rather prominent beneath but obscure above; petioles 1.5-3 cm long, strigillose; spike short, solitary, terminal, sessile or short peduncled, 2-2.5 cm long, 1-1.5 cm wide (excluding corollas), the rachis densely sericeous; bracts lanceolate, 18-20 mm long, 4-6 mm wide, acuminate, cuneate at base, entire, densely sericeous

without, glabrous within, obscurely nerved; bractlets lanceolate, 9-10 mm long, 1.5-2 mm wide, densely sericeous without, glabrous within; calyx 5-6 mm long, acute, the posterior segment 3 mm wide, the anterior segments 2 mm wide, the lateral segments 1.5 mm wide, all striate-nerved, inconspicuously sericeous without, finely ciliolate at tip; corolla orange, glabrous except the limb, these finely pubescent, 5.5-6 cm long, the tube narrowly funnelliform, 2 mm broad at base, the tube 40 mm long, 7 mm broad at mouth, the upper lip erect, ovate, 20 mm long, 10 mm wide at base, inconspicuously and minutely bilobed at tip, the lower lip erect or spreading, 3-lobed, the middle lobe oblong, 22 mm long, 7 mm wide at base, acute, the lateral lobes linear, 12 mm long, 1.5 mm wide, adnate in part to the upper lip; stamens exserted 16 mm beyond the mouth of the corolla tube; anthers 4.5 mm long, 0.75 mm broad, acute at both ends, glabrous; filaments 45 mm long, glabrous; style 55 mm long, glabrous; capsule not seen.

Type. Steyermark & Agostini 1 (holotype US, isotypes NY, VEN), Venezuela, Aragua: Parque Nacional Henry Pittier, on Pico Periquito, 1,250-1,600 m alt, 4 Sep 1960.

Distribution. Known only from the type locality.

VENEZUELA. ARAGUA: Parque Nacional Henry Pittier (Rancho Grande), road to El Portachuelo, 3 Sep 1965, Castellanos 32 (VEN); Parque Nacional Henry Pittier, 1956, Herb. Nac. Venezuela 40115.

Aphelandra steyermarkii is somewhat like A. tomentosa, but that species has smaller leaf blades, shorter, acute to obtusish, pilose bracts, shorter corollas (5 cm long), and an entire upper lip.

#### 24. APHELANDRA BENOISTII Wasshausen, sp. nov.

Frutex; caules teretes, minute tomentosi; lamina foliorum haud lobata, oblongo-lanceolata, 5.5-9.5 cm longa et 3-4 cm lata, acuminata, basi cuneata, serrata, dentibus spinis terminatis, subcoriacea, supra parce tomentosa, subtus glabra; spicae 1 vel plures, terminales et axillares, sessiles, rachidi tomentosa; bracteae virides, rhombatae, acuminatae et spina terminatae, tomentosae, marginibus spinis armatae; bracteolae lanceolatae, apice spina terminatae, pilosae; calycis segmenta oblonga, subaequalia, acuminata et cuspidata, pilosa, ciliata; corolla aurantiaca, pilosa, labio superiore erecto, elliptico, bilobato, labio inferiore 3-lobato, lobis oblongis, subaequalibus, obtusis.

Shrub; stems terete, minutely and inconspicuously tomentose; leaf blades oblong-lanceolate, 5.5-9.5 cm long and 3-4 cm wide, gradually narrowed to a slender acuminate tip, cuneate at base, thick, subcoriaceous, serrate, the teeth rather closely set, 2-3 mm long, each terminating in sharp, straight, yellowish spines 1-2 mm long, the upper surface nitid, sparingly tomentose, the lower surface glabrous or the costa and lateral veins (12-13 pairs) sparingly tomentose, the costa and veins prominent, the veinlets reticulately anastomosing; petioles 1 cm long,

densely tomentose; interpetiolar bracts small, triangular, 2-3 mm long, subtomentose, the veins excurrent, ending in 1-5 straight sharp yellowish spines to 5 mm long, the middle one longer than the others; spikes one to several, terminal and in the axils of the upper leaves, sessile, short, 5-6 cm long, 1.5 cm wide, the rachis tomentose; bracts green, rhombate, 18 mm long, 11 mm wide, acuminate and spine-tipped, the margins ending in a pair of distinctively yellow spines, tomentose, especially near the base, 3-nerved, rather conspicuously reticulate near tip; bractlets lanceolate, 12 mm long, 3 mm wide, subfalcate, carinate, gradually narrowed to a slender point tipped by a spine 1.5 mm long, pilose without, especially near the margins, striate-nerved; calyx segments oblong, subequal, 9 mm long, acuminate and cuspidate, pilose, ciliate, striate-nerved, the posterior segment 3 mm wide, the anterior pair 2.5 mm wide, the lateral pair 2 mm wide; corolla orange, moderately pilose, 3-3.5 cm long, the tube 2 mm broad at base, gradually enlarged to 6 mm at mouth, the upper lip erect, elliptic, 8 mm long and 4 mm wide, bilobed, the lobes elliptic, 3.5 mm long, 2 mm wide, obtuse, the lower lip 3-lobed, the lobes oblong, subequal, erect, the middle lobe 4 mm long and 2.5 mm wide, the lateral lobes 4 mm long and 1.5 mm wide, all obtuse; stamens barely extending beyond the mouth of the corolla tube; anthers 5 mm long, 1 mm wide, acute at both ends; capsules not seen.

Type. R. Benoist 3986 (holotype P), Ecuador, Pichincha: Mojanda, 3 Mar 1931.

Distribution. Known only from the type locality.

Aphelandra benoistii is perhaps nearest in relationship to A. grangeri, but differs markedly in its much longer and broader, rhombate, tomentose, and spiny-margined bracts.

## 25. APHELANDRA FASCICULATA Wasshausen, sp. nov.

Suffrutex; caules dense strigosi, pilis sordidis; lamina foliorum late elliptica vel oblonga, acuminata (apice ipso obtuso), basi angustata, in petiolum decurrens, integra, glabra vel parce strigosa; spicae 1 vel plures, terminales, sessiles, rhachidi glabra; bracteae rubrae vel aurantiacae, ovatae, acuminatae, 11-13 mm longae et 9-10 mm latae, integrae, glabrae, ocellis suborbicularibus, brunneis, nitidis; bracteolae lanceolatae vel ovatae, acutae; calycis segmenta lanceolata, subaequalia, glabra et glanduloso-punctata; corolla coccinea vel aurantiaca, papillosa, labio superiore erecto, ovato, bilobato, lobis triangulo-ovatis, labio inferiore trilobato, labio medio elliptico, lobis lateralibus cum labio superiore basi connatis.

An erect, suffrutescent shrub 2-4 m high; stems quadrangular toward tip, densely strigose, the hairs sordid; leaf blades broadly elliptic to oblong, 22-27 cm long, 7-9 cm wide, acuminate (the tip obtuse), narrowed at base and decurrent on the petiole, subcoriaceous, entire, the upper surface dark green, glabrous to sparingly strigose, the costa and lateral veins (10-12 pairs) slightly raised, scarcely conspicuous, the lower surface dull green, glabrous or sparingly strigose, especially the

costa and lateral veins; petioles (unwinged portion) 0.5-2 cm long, the pubescence similar to that of the stem; flowers borne on one or several, terminal, sessile spikes, these 8-30 cm long and 1-1.5 cm wide (without corollas), the rachis glabrous; bracts imbricate, entire, red or dull orange with blackish tip, coriaceous, ovate, 11-13 mm long and 9-10 mm wide, exceeding calyx, acuminate, glabrous, the costa rather prominent, the flanking nerves fairly prominent except toward tip, the marginal area bordered by a narrow subhyaline edge, the ocelli usually 6 or 8, well defined, suborbicular, brown, nitid; bractlets lance-ovate, falcate, carinate, 11 mm long, 3 mm wide, acutish, glabrous and minutely glandular-punctate except the costa and keel, these sparingly puberulous; calyx segments lanceolate, 9-10.5 mm long, subequal, the posterior segment 5.5 mm wide, the anterior pair 3 mm wide, the lateral segments 2.5 mm wide, all glabrous and minutely glandular-punctate, striate-nerved, acute to acuminate; corolla red or orange-red, densely papillose, 5 cm long from base to tip of upper lip, 5 mm broad at base, narrowed to 3 mm at 5 mm above base, thence enlarged to a slightly curved subcylindric throat, 11 mm broad at mouth, the upper lip erect, ovate, 11-12 mm long and 7 mm wide, bilobed at tip, the lobes triangular-ovate, 3.5 mm long, 2 mm wide, acute, the middle lobe of the lower lip spreading, elliptic, 12 mm long, 6 mm wide, the submucronate tip slightly recurved, the lateral lobes about 7 mm long, partly adnate to the lower part of the upper lip, their free portion 6 mm long and 1.5 mm wide, rounded; stamens exserted about 1 cm beyond the mouth of the corolla tube; anthers 4-5 mm long, 1 mm broad, acute at both ends; capsule not seen.

Type. L. Aristeguieta 3180 (holotype US, isotype VEN), Venezuela, Miranda: Guatopo, 600 m alt, Jun 1958.

Distribution. Endemic to Venezuela, at elevations between 10 and 1,400 meters.

VENEZUELA. MIRANDA: Parque Nacional de Guatopo: Between Santa Teresa and Altigracia de Orituco, 520 m alt, 23 Nov 1961, Steyermark 89935 (US, VEN); 27 Oct 1966, Steyermark 97548 (US, VEN); Camino de la Guzmanera, Sep 1966, Aristeguieta & Agostini 6350 (US, VEN); 4-5 km N of Carenero, 10-50 m alt, 22 Nov 1969, Steyermark & Bunting 102317 (US, VEN); El Guapo, 200 m alt, Oct 1959, Aristeguieta 4004 (VEN). DISTRITO FEDERAL: Upper Carrasquel Valley, 7 Nov 1925, Pittier 11944 (US, VEN); hills of Camurí Grande, 20-800 m alt, 8 Nov 1928, Pittier 13038 (US, VEN). ARAGUA: Colonia Tovar, Karsten s n (LE, W); Colonia Tovar, Engels s n (LE); above Turiamo, 550 m alt, 5 Oct 1938, Williams 10419 (US, VEN); Parque Nacional, Valle de Ocumare, 4 Oct 1947, Pittier 15601 (US, VEN). YARACUY: Los Cañizos, plains of the Yaracuy River, 50 m alt, 23 Jan 1920, Pittier 8755 (US); Yumare, Aroa Basin, 24 Sep 1923, Pittier 11213 (US, VEN); Forest of Yumare, 100 m, 7 Feb 1959, Bernardi 6930 (K, VEN); new-highway San Felipe-Aroa, 27 Nov 1952, Aristeguieta & Pannier 1154 (VEN); Valle of Yaracuy, forest plain between El Diamante & El Chino, 12 Dec 1952, Aristeguieta & Foldats 1250

(VEN). YARACUY-FALCÓN: Reserva Forestal "Rio Tocuyo", Pica no. 13, Aug 1970, Blanco 912 (VEN). FALCÓN: Sierra de San Luis, between Curimagua and San Luis, 1300-1400 m alt, 18 Jul 1967, Steyermark 99105 (US, VEN). MERIDA: Carretera (highway) Jaji-Merida, Sep 1961, Tamayo 4510 (VEN). BARINAS: Soledad, 20 km N of Barinitas, 1100 m, 28 Sep 1953, Little 15559 (VEN). WITHOUT EXACT LOCALITY: Funck & Schlim s n (P); Andes de Truxillo et de Merida, 1,200-4,350 m alt, 1843, Linden 496 (P); S. Estéban, 1893-94, Mocquerys s n (COL, P, US, VEN).

Aphelandra fasciculata is distinguished from A.

pharangophila, its nearest relative, by the larger, glabrous bracts, the shorter corolla, and the smaller limb. In A. pharangophila, the bracts are strigose, 7-10 mm long, 5.5-6 mm wide, the corolla 5.5-6.5 cm long, and the limb 17-20 mm long.

## 26. APHELANDRA PHAINA Wasshausen, sp. nov.

Suffrutex; caules teretes, parce subtomentosi; lamina foliorum haud lobata, oblonga, acuminata, basi angustata et obtusa, coriacea, glabra, marginibus serrato-dentatis, dentibus triangularibus, spina terminatis; spicae terminales, pedunculatae, pedunculis et rachidibus glabris; bracteae rubrae, ovatae, coriaceae, acuminatae et subinde spina terminata, glabrae; bracteolae lanceolatae, glabrae; calycis segmenta rubra, subaequalia, oblongo-elliptica, acute et mucronulata, striato-nervata, glabra; corolla coccinea, glabra, labio superiore erecto, elliptico, obtuso, labio inferiore patulo, 3-lobato, lobo medio obovato, obtuso, lobis lateralibus obtusis.

Suffrutescent, branched shrub, 2 m high; stems sparingly subtomentose toward tips, terete; leaf blades oblong, 12-15 cm long, 4.5-5.5 cm wide, acuminate, gradually narrowed and obtuse at base, firm, coriaceous, glabrous or the costa and veins (numerous) bearing a few hairs, the margins serrate-dentate, the teeth triangular, 4-5 mm high, ending in sharp spreading spines 2-3 mm long, the upper surface drying bright yellowish-green, the lower surface drying a dull olivaceous, the venation very prominent, especially on the lower surface, the veinlets coarsely reticulate toward margins; petioles 1-1.5 cm long, glabrous or sparingly tomentose; interpetiolar bracts oblong to ovate, 16 mm long, 9 mm wide, serrate-dentate, the teeth terminating in spines, the terminal one short, 1 mm long, the lateral ones 4 mm long; flowers borne in terminal, peduncled spikes 17.5 cm long and about 3 cm broad (excluding corollas), the peduncle (about 5.5 cm long) and rachis glabrous; bracts reddish, ovate, 20-23 mm long, 11.5-12 mm wide, acuminate and occasionally spine-tipped, nitid, coriaceous, striate-nerved, entire, glabrous; bractlets lanceolate, 12 mm long, 4 mm wide, short-acuminate, the tip a small mucro, subcarinate, coriaceous, striate-nerved, glabrous; calyx segments red, oblong-elliptic, 16-17 cm long, acute and mucronulate, striate-nerved, glabrous, the segments subequal, the posterior one 4.5 mm wide, the anterior pair 4 mm wide and the lateral pair 3.5 mm wide; corolla crimson, glabrous, 5-5.5 cm long, the tube 4 mm broad

at base, narrowed to 3 mm at 1 cm above base, thence gradually enlarged to 7 mm at mouth, the upper lip erect, elliptic, 14 mm long, 7 mm wide, the tip obtuse and entire, the lower lip 3-lobed, more or less spreading, the middle lobe obovate, 8 mm long, 7 mm wide, obtuse, the lateral lobes 8 mm long, 7 mm wide, obtuse or rounded; stamens terminating at tip of upper corolla lip; anthers 9 mm long, 1.5 mm wide, acute, glabrous; capsule not seen.

Type. W. H. Camp E-4292 (holotype US, isotype NY), Ecuador, Azuay: Eastern Cordillera, 1-8 km N of Sevilla de Oro, 2,400-2,700 m alt, 27 Jul 1945.

Distribution. Endemic to Ecuador, in the provinces of El Oro and Azuay at elevations between 2,135-2,700 meters.

ECUADOR. EL ORO: Near Pampa de los Cedros, south of Cerro Chivo-Turco, forested slopes along quebradas tributary to Río Palma, 2,135-2,285 m alt, 11 Aug 1943, Steevermark 53783 (F).

Aphelandra phaina is closely related to A. chrysantha Wasshausen, but the bracts of that relative are pale green, the calyx yellowish green, and the corolla yellow.

27. APHELANDRA RETICULATA Wasshausen, sp. nov.

Suffrutex; caules dense tomentosi; lamina foliorum oblonga-elliptica, haud lobata, ad 10 cm longa et 3 cm lata, acuminata et spinis terminata, basi angustata, pilosula, marginibus spinoso-dentatis; spicae terminales, rhachidi subtomentosa; bracteae lanceolatae, integrae, apice spina terminatae; bracteolae lanceolatae, apice spina terminatae, pilosulae; calycis segmenta anguste triangularia, subaequalia, striato-nervata, ciliata; corolla aurantiaca, pubescens, labio superiore elliptico, bilobato, labio inferiore 3-lobato, lobis orbicularibus.

Suffrutescent shrub 2-4 m high, the bark smooth, grayish; stems densely yellowish-white-tomentose; leaf blades oblong-elliptic, 9-10 cm long and 3 cm wide, acuminate and spine-tipped, narrowed at base, subcoriaceous, the margins spinose-dentate, the spines 1-1.5 mm long, both surfaces pilosulous, the hairs whitish, densest on the costa and veins, the upper surface nitid, rugose, the lower surface strongly reticulate-nerved; petioles about 1 cm long, tomentose; interpetiolar bracts small, triangular, 5 mm long, consisting mainly of 2, sharp, yellowish spines 3 mm long; flowers borne in terminal spikes, these 6-7 cm long and 1-1.5 cm in diam, the bracts erect-spreading, the rachis subtomentose; bracts lanceolate, 13-15 mm long, 4 mm wide at base, gradually narrowed to a slender spine-tipped point, entire, the lowermost bracts intergrading into stem leaves, these occasionally bearing several spine-tipped teeth on the margins, subtomentose; bractlets lanceolate, 1 cm long, 2 mm wide at base, gradually narrowed to a slender spine-tipped point, one-nerved, faintly striate, pilosulous; calyx segments narrowly triangular, striate-nerved, subequal, 8 mm long, the posterior segment 2.5 mm wide at base, the anterior pair 2 mm wide, the lateral pair 1.5 mm

wide, all spine-tipped, ciliate; corolla orange,  $4\text{ mm}$  long, finely pubescent, gradually enlarged from  $4\text{ mm}$  at base to  $9\text{ mm}$  at mouth, the upper lip elliptic,  $9\text{ mm}$  long and  $4\text{ mm}$  wide, 2-lobed, the lobes elliptic,  $3\text{ mm}$  long and  $2\text{ mm}$  wide, obtuse at apex, the lower lip 3-lobed, the lobes orbicular, the middle lobe  $4\text{ mm}$  long,  $8\text{ mm}$  wide, the lateral lobes  $4\text{ mm}$  in diam; stamens as long as the lower lip, glabrous; anthers  $4.5\text{ mm}$  long, glabrous; style exceeding anthers by  $3\text{ mm}$ , glabrous; capsule not seen.

Type. W. Gehriger 294 (holotype US, isotypes F, MO, VEN), Venezuela, Mérida: Mucuruba, 780-810 m alt, 3 Jul 1930.

Distribution. Known only from the type locality.

Aphelandra reticulata is distinguished from A. mutisii, its nearest relative, by the strongly reticulate and rugose leaf blades, the entire bracts and the larger corollas. The corolla of A. mutisii is about  $3\text{ cm}$  long and the leaf blades, although very similar in shape, size, and pubescence, are faintly if at all rugose and reticulate.

## 28. APHELANDRA RUBRA Wasshausen, sp. nov

Suffrutex; caulis sursum strigosus; lamina foliorum haud lobata, elliptica vel oblonga, breviter acuminata, basi angustata, serrata, strigosa, marginibus basi armatis; spicae 1 vel plures, terminales, pedunculatae, rachidi puberula; bracteae supra rubrae, ovatae, acuminatae, glabrae, spinuloso-dentatae; bracteolae subulatae, rubrae, acuminatae, glabrae, ciliolatae; calycis segmenta subaequalia, triangulares, striato-nervata, glabra; corolla ignota.

Suffrutescent herb; stems terete, the upper portion moderately strigose, the hairs appressed; leaf blades elliptic to oblong, 27-36 cm long and 7-7.5 cm wide, short-acuminate, narrowed from middle or slightly below middle to a long-attenuate base, serrate, the veins terminating above middle in about 4 pairs of teeth, these ascending, about 5 mm long and 15 mm broad, the attenuate portion of the leaf blades armed with 3-4 spine-tipped teeth, the upper surface sparingly strigose, the lower surface more densely so, the hairs sub-appressed, those of the costa and lateral veins (about 19 pairs) appressed, the venation rather prominent, more so beneath than above; petioles 1.5-3 cm long, strigose, the hairs upwardly appressed; interpetiolar bracts small, leaf-like, triangular, about 7 mm long, densely strigulose, spine-tipped, the spine about 1 mm long; flowers borne in 1 or several terminal, peduncled spikes, 15-24 cm long, 2-3 cm wide, moderately dense, the peduncle 2-3 cm long, strigulose, the rachis puberulous, the hairs whitish; bracts red, greenish at tip, ovate, 20 mm long and 15 mm wide including the spines, acuminate, subchartaceous, striate-nerved, glabrous, the margins spinose-toothed, the teeth (11-13 pairs) produced by the continuation of the lateral veins, successively larger and more spinose toward apex, the spines ascending, 2 mm long; bractlets subulate, red, 15 mm long, 2 mm wide, long-acuminate,

glabrous, the margins sparingly ciliolate; calyx segments subequal, triangular, 10-17 mm long, the posterior segment 16-17 mm long, 5 mm wide at base, the anterior pair 16 mm long, 3 mm wide, the lateral pair 10 mm long, 2 mm wide, carinate, all striate-nerved, subhyaline, the margins entire; corollas wanting; capsule oblong, 12.5 mm long, 4 mm broad, shining, light brown, muriform; seeds drying light brown, 3 mm long, 2.5 mm wide, densely hirsute and glandular-punctate.

Type. B. A. Krukoff 10146 (holotype US, isotype NY), Bolivia, La Paz: S. Yungas, basin of Río Bopi, San Bartolome (near Calisaya), 750-900 m alt, 1-22 Jul 1939.

Distribution. Andean Peru and Bolivia, at elevations between 450-750 meters.

PERU. LIMA: Valley below Chacilla, 900 m alt, May 1866, Pearce s n (K). BOLIVIA. LA PAZ: San Buenaventura, 450 m alt, 19 Nov 1901, Williams 646 (K). WITHOUT EXACT LOCALITY: "Peru", 1820, Haenke s n (M, F photo 20495). The locality here is possibly erroneous; Haenke could have collected this specimen in Bolivia and not Peru.

Aphelandra rubra is perhaps nearest in relationship to A. rusbyi, but differs markedly in that its bracts are glabrous, acuminate, and the margins bearing on each side 11-13 slender, spinose teeth.

29. APHELANDRA GUAYASII Wasshausen, sp. nov.

Suffrutex; caules subquadrangulares, puberuli; lamina foliorum oblongo-ovata, acuminata (apice ipso obtuso), basi angustata, in petiolum decurrens, glabra vel parce puberula; spicae 1 vel 3, terminales, pedunculatae, rachidi glanduloso-pilosula; bracteae ovatae, 14-17 mm longae et 8 mm latae, acuminatae, cuneatae, coloratae, dense glanduloso-pilosae, ciliatae; bracteolae lanceolatae, subcarinatae, aristatae, striato-nervatae, glanduloso-pilosae; calycis segmenta lanceolata, subaequalia, acuminata et spina terminata, striato-nervata, extra glandulo-pilosa; corolla straminea, 5.5-6.5 cm longa, pilosa vel glanduloso-pilosa, labio superiore ovato, erecto, integro, retuso, labio inferiore patulo, 3-lobato, lobis subaequalibus, lobo medio ovato, lobis lateralibus oblongis.

Suffrutescent shrub, to 7.5 m high; stems subquadrangular, puberulous; leaf blades oblong-ovate, 18-21 cm long, 6.5-7 cm wide, acuminate (the tip rounded), narrowed and conspicuously long-attenuate at base, firm, entire, the upper surface dark-olivaceous, glabrous or sparingly and inconspicuously puberulous, the lower surface pale-olivaceous, sparingly puberulous, especially the costa and lateral veins, these rather inconspicuous, more prominent though beneath than above; petioles (unwinged portion) 1.5-2.5 cm long, hirtellous; flowers borne in one to three, terminal, peduncled spikes, these 7-9 cm long and 2 cm wide (excluding corollas), subtended by several, small, lanceolate leaves near the base, these 10 mm long, 2 mm wide, the bracts densely imbricate, viscid, the peduncle 1-1.5 cm

long, hirtellous and glandular-punctate, the rachis glandular-pilose; bracts ovate, 14-17 mm long and 8 mm wide, acuminate, cuneate, colored, densely white-glandular-pilose, 3-nerved, the margins entire, ciliate; bractlets lanceolate, subcarinate, 9 mm long, 1.5 mm wide, aristate, striate-nerved, subhyaline, glandular-pilose; calyx segments lanceolate, 12 mm long, subequal, acuminate and spine-tipped, striate-nerved, glandular-pilose without, glabrous within, the posterior segment 3.5 mm wide, the anterior pair 2.5 mm wide, the lateral ones 2 mm wide; corolla straw-colored, 5.5-6.5 cm long, sparingly pilose to glandular-pilose, the tube erect, 3 mm wide at base, slightly narrowed at 5 mm above base, thence gradually enlarged to 8 mm at mouth, the upper lip ovate, erect, 2.4 cm long, 1.3 cm wide, entire, retuse, the lower lip spreading, 3-lobed, the lobes subequal, the middle lobe ovate, 2.4 cm long, 1.5 cm wide, acute, the lateral lobes oblong, 7 mm long, 3 mm wide, obtuse or rounded; stamens exerted 2.2 cm beyond the mouth of the corolla tube; anthers 5-6 mm long, arachnoid at tip, mucronulate at base; ovary 4 mm long, 2 mm wide, glabrous; capsule not seen.

Type. O. Haught 3085 (holotype US), Ecuador, Guayas: 18 km W of Pedro Carbo, 5 Aug 1940.

Distribution. In the vicinity of Guayaquil, Ecuador.

ECUADOR. GUAYAS: 10 km NW of Guayaquil on road to Salinas, 13 Sep 1961, Dodson & Thien 513, 515 (MO, US); 12 km from Guayaquil, 22 Aug 1961, Gilmartin 503 (US); Julio Moreno, Cerro de Isera, 250 m alt, 23 Jul 1962, Jativa & Epling 149 (US); Cerro Azul, vicinity of Guayaquil, 14 Jun 1955, Asplund 16641 (S, US); 10 Sep 1955, Asplund 17600 (S, US); 50 m alt, 22 Oct 1958, Harling 3029 (S, US).

This species is very similar in general aspect to Aphelandra madreensis Lindau, but its longer, glandular-pilose corolla and the entire, longer and broader upper and lower corolla lips set it well apart. With no collections available to connect the widely separate ranges of the two taxa, it seems advisable to regard them as distinct species.

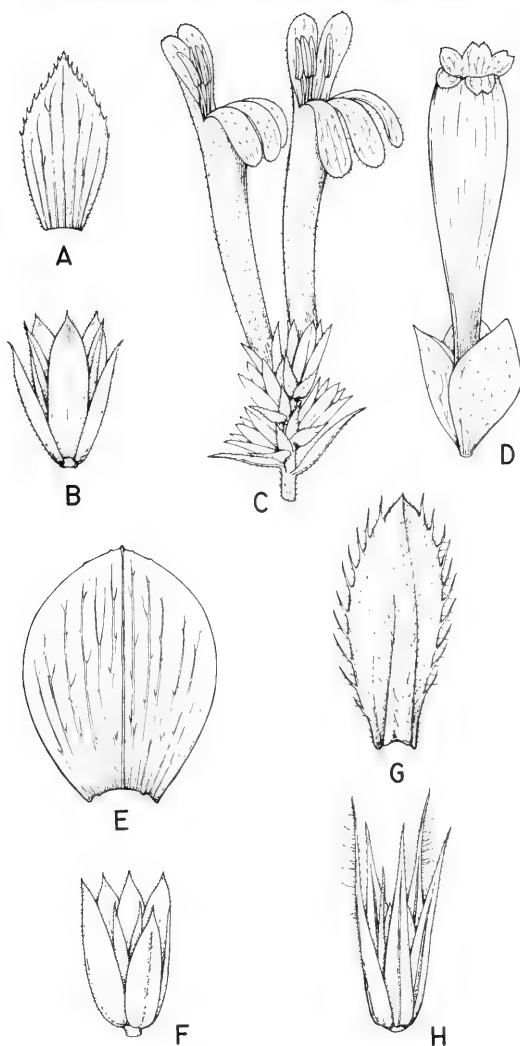


Fig. 1. Species of Aphelandra. A-B, *A. ferreyrae* (Ferreyra 4333): A, bract x 2; B, bractlets and calyx segments, x 2. C, *A. hapala* (Ferreyra 1670): C, inflorescence, x 1. D, *A. campii* (Camp E-1371): D, bracts and corolla, x 2. E-F, *A. latibracteata* (Ferreyra 1908): E, bract, x 2; F, bractlets and calyx segments, x 2. G-H, *A. cuscoensis* (Vargas 15415): G, bract, x 1; H, bractlets and calyx segments, x 1.

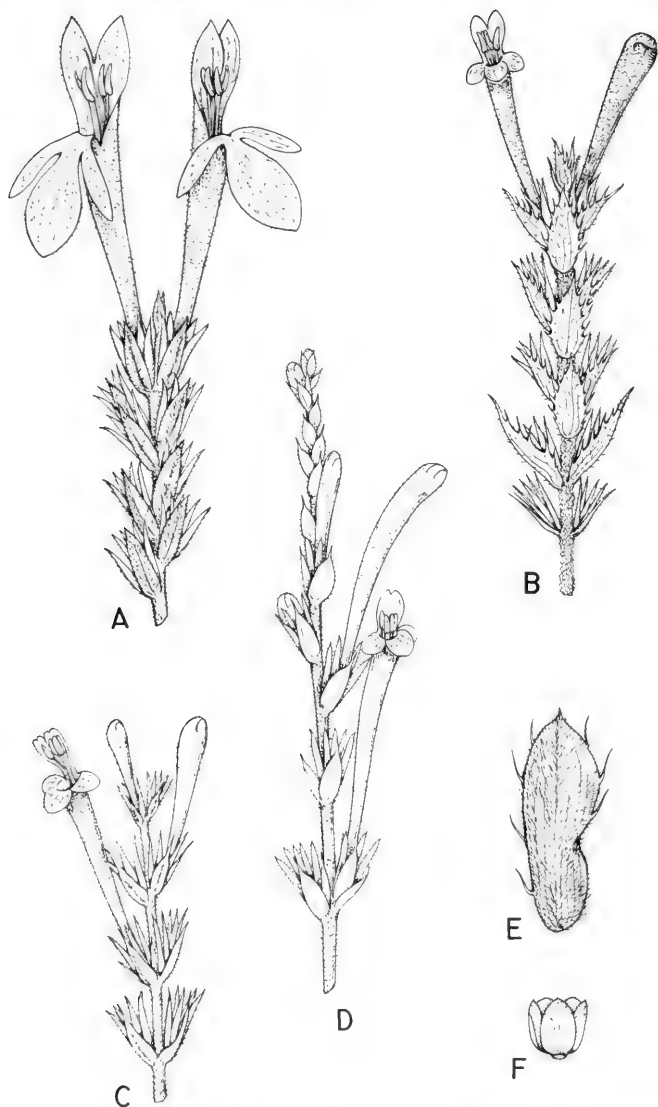


Fig. 2. Species of *Aphelandra*. A, *A. peruviana* (Weberbauer 6952): A, inflorescence, x 1. B, *A. juninensis* (Weberbauer 6537): B, inflorescence, x 1. C, *A. wurdackii* (Wurdack 1487): C, inflorescence, x 1. D, *A. tillettii* (Tillett 673-291): D, inflorescence, x 1. E-F, *A. dasyantha* (Vidal-Senège s n): E, bract, x 1; F, calyx, x 1.

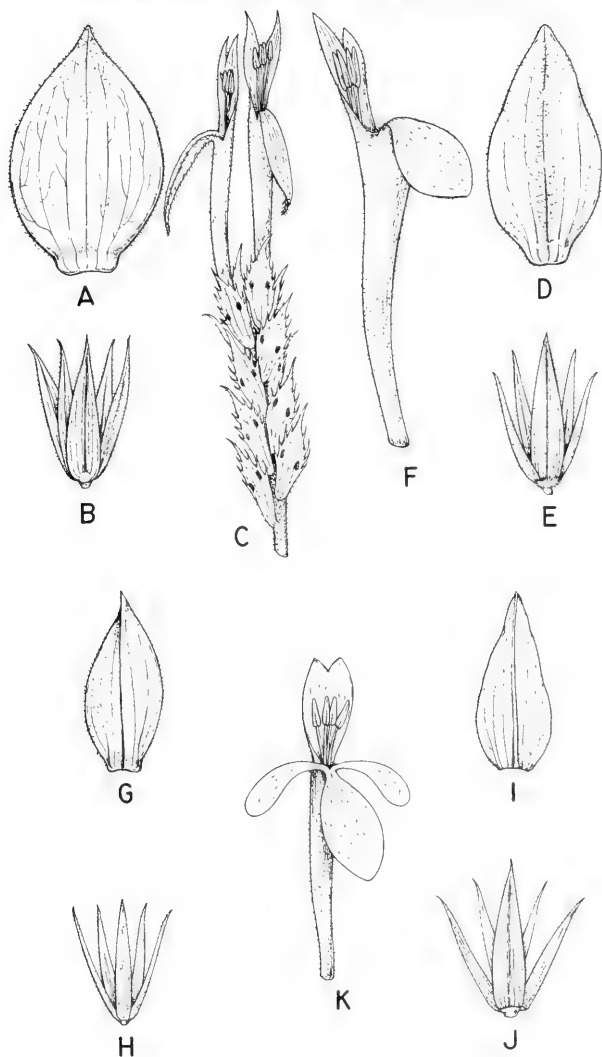


Fig. 3. Species of Aphelandra. A-B, A. madrensis (Hinton 11062): A, bract, x 2; B, calyx segments, x 2. C, A. dukei (Duke 14397): C, inflorescence, x 1. D-F, A. hintonii (Hinton 16049): D, bract, x 1; E, calyx segments, x 1; F, corolla, x 1. G-H, A. diffusa (Jorgensen & Prieto JP-52): G, bract, x 1; calyx segments, x 1; I-K, A. galba (Camp E-830): I, bract, x 1; calyx segments, x 1; K, corolla, x 1.

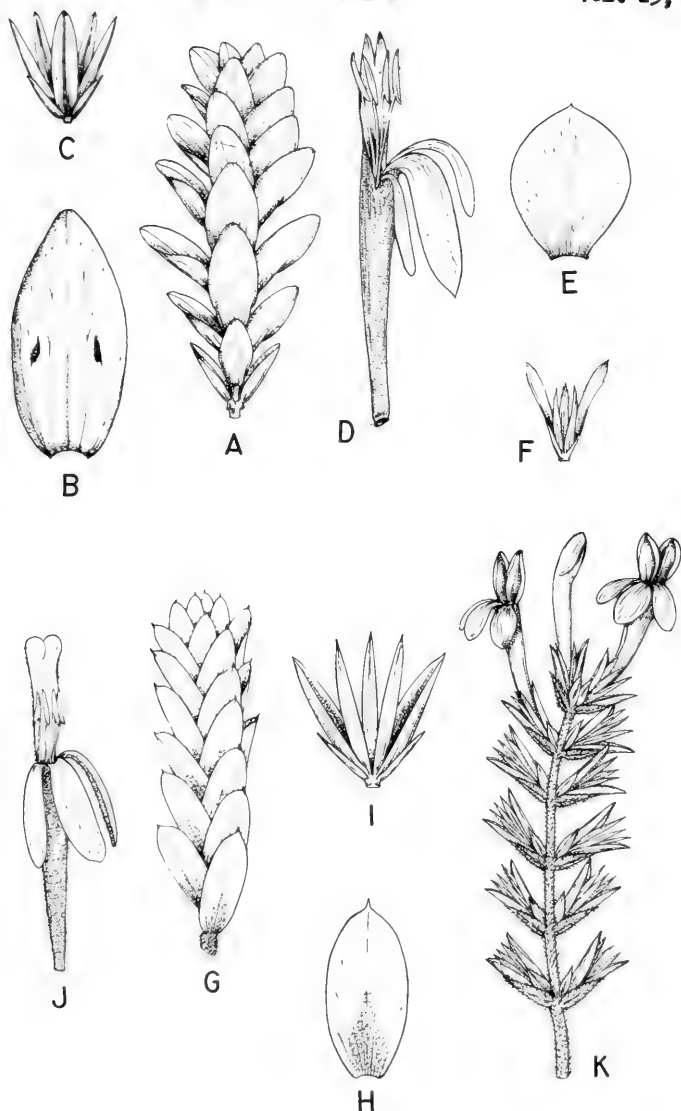


Fig. 4. Species of *Aphelandra*. A-D, *A. dariensis* (Duke & Elias 13756): A, inflorescence,  $\times \frac{1}{2}$ ; B, bract,  $\times 1$ ; C, bractlets and calyx segments,  $\times 1$ ; D, corolla,  $\times 1$ . E-F, *A. kingii* (King & Guevara 6136): E, bract,  $\times 1$ ; F, bractlets and calyx segments,  $\times 1$ . G-J, *A. paulensis* (Kuhlmann & Gehrt s n): G, inflorescence,  $\times \frac{1}{2}$ ; H, bract,  $\times 1$ ; bractlets and calyx segments,  $\times 1$ ; corolla,  $\times 1$ . K, *A. nephoica* (Grubb, Curry & Fernandez 651): K, inflorescence,  $\times 2$ .

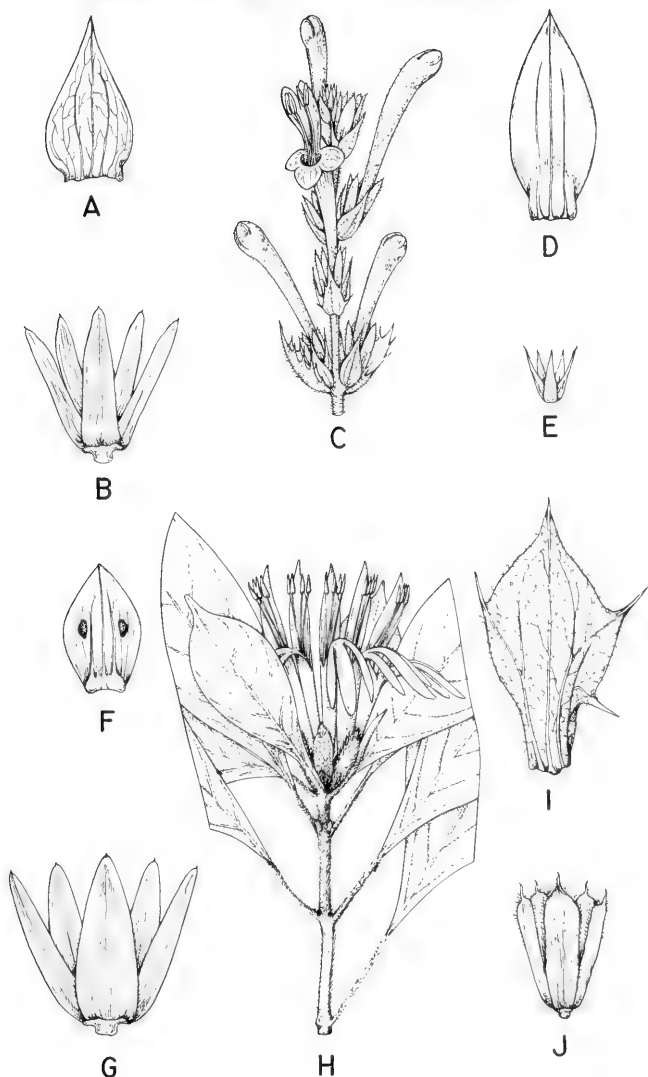


Fig. 5. Species of Aphelandra. A-B, A. chrysanthia (Camp E-4291): A, bract, x 1; B, calyx segments, x 1. C, A. cinnabarina (Camp E-3374): C, inflorescence, x 1. D-E, A. dodsonii (Dodson & Thien 1612): D, bract, x 1; E, calyx segments, x 1. F-G, A. attenuata (Dodson & Thien 1647): F, bract, x 1; G, calyx segments, x 1. H, A. steyermarkii (Steyermark & Agostini 1): H, inflorescence, x  $\frac{1}{2}$ . I-J, A. benoistii (Benoist 3986): I, bract, x 1; J, calyx segments, x 1.

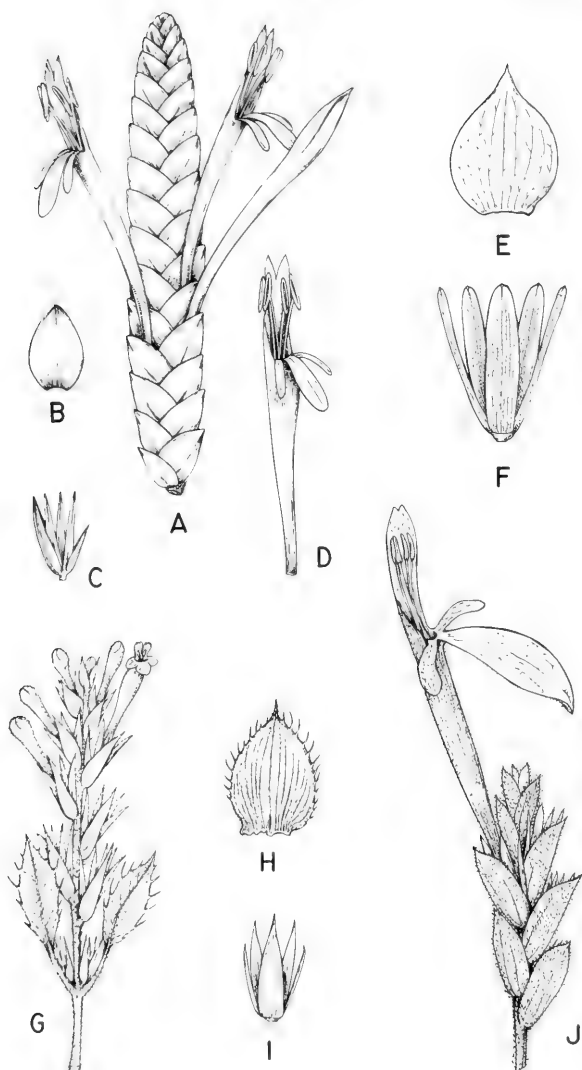


Fig. 6. Species of *Aphelandra*. A-D, *A. fasciculata* (Aristeguieta 3180): A, inflorescence, x 1; B, bract, x 1; C, bractlet and calyx segments, x 1; D, corolla, x 1. E-F, *A. phaima* (Camp E-4292): E, bract, x 1; F, calyx segments, x 1. G, *A. reticulata* (Gehriger 294): G, inflorescence, x 1. H-I, *A. rubra* (Krukoff 10146): H, bract, x 1; I, calyx segments, x 1. J, *A. guayasli* (Haught 3085): J, inflorescence, x 1.

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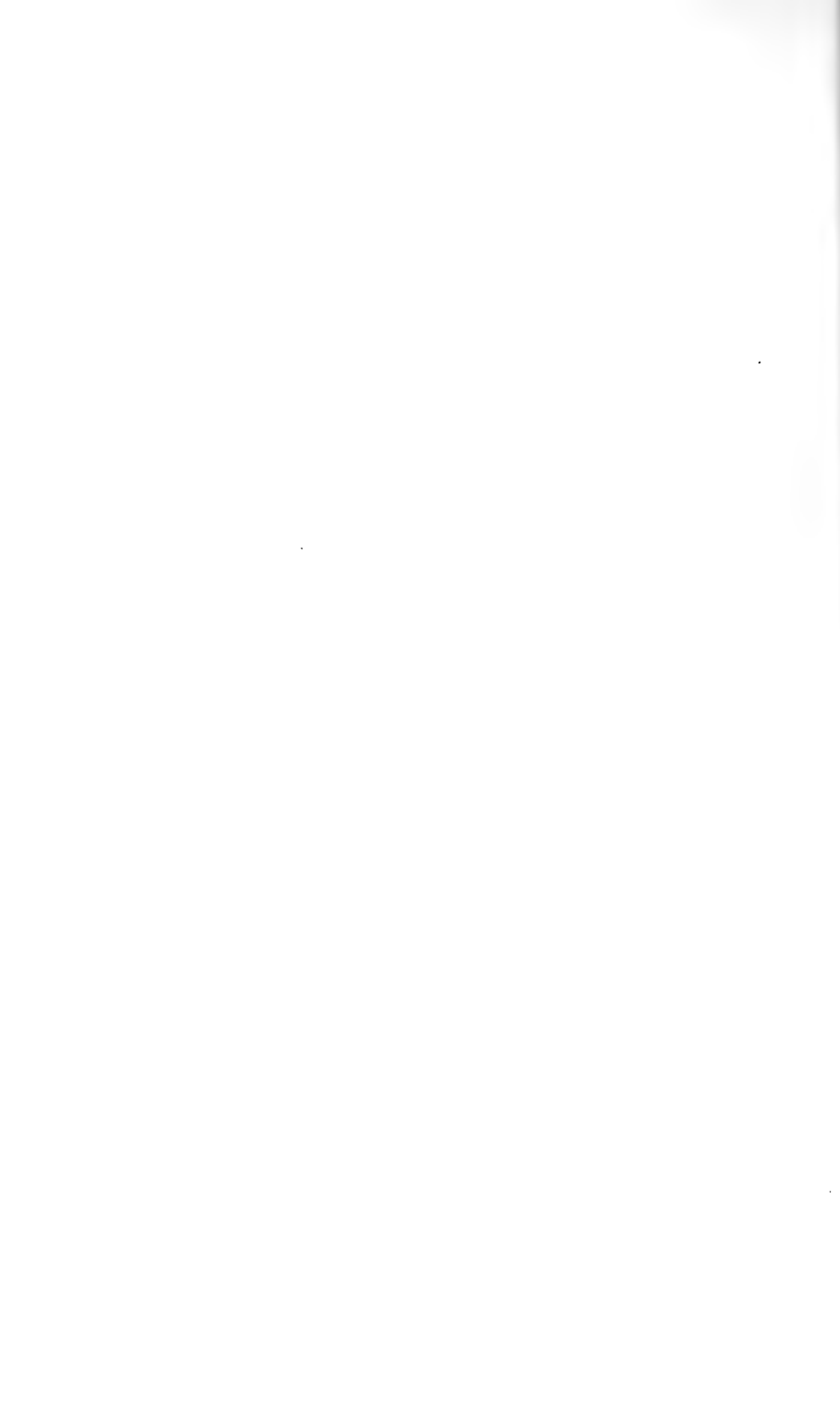
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